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THE UNIVERSITY OF PENNSYLVANIA
RURAL DEVELOPMENT PROGRAM

GENERAL REPORT NO. 13

OCTOBER, 1968

BANGLADESH

THE UNIVERSITY OF TENNESSEE

INDIA AGRICULTURAL PROGRAM

under

THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

GENERAL REPORT
Number 13

Edited by

T. F. Buehrer
Group Leader

October, 1965
Bangalore

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INTRODUCTION

This report covers the activities of the University of Tennessee/India Agricultural Program under sponsorship of the U.S. Agency for International Development and covers the period November 1, 1964 to October 31, 1965.

A semi-annual report was issued on May 15, 1965 covering the first half of the year namely November 1, 1964 to April 30, 1965.

The primary objective of this Program is to render assistance in every feasible way, as and when requested by the Vice-Chancellor and his key staff, in the development of the new University of Agricultural Sciences, whose main offices are located at Hebbal, Bangalore and an additional agricultural college at Dharwar in Mysore State.

To this end five advisors have been serving during the report period representing the following fields: Administration and Education, Agronomy, Agricultural Extension, Farm Management and Veterinary Science. Of these the last two advisors mentioned, namely Dr. H. A. Henderson in Farm Management and Dr. G. K. Garlick in Veterinary Science arrived at the beginning of the year.

Two consultantships, to the Registrar and Comptroller, respectively, which had been sanctioned for the past two years still remain unfilled. A sixth post of advisor in Agricultural Engineering has been approved and an appropriate candidate located, but his appointment will not be finalized until a staff in this field has been appointed. Action is under way in this direction.

The advisors' reports which are to follow indicate that material progress has been made in the directions of assisting in the development of the University and to help increase food grain production in Mysore State.

ADVISORS' REPORTS

GROUP LEADER AND ADVISOR IN ADMINISTRATION AND EDUCATION -- T. F. BUEHRER

Phenomenal progress has been made during the past year in the development of the new University under the able and energetic leadership of the Vice-Chancellor, Dr. K. C. Naik. The Board of Regents is composed of members who are progressive in their thinking and realize the potential value of the agricultural university in the development of the State's agricultural economy. Drawn in accordance with the statutes, the proposals submitted to the Board by the Vice-Chancellor, after thorough examination and concurrence of the Academic Council, have usually been promptly approved, thus making possible gradual progress. There is a sense of urgency in this development. Yet, while rapid development is the important objective, there is also a sense that substantial growth will occur only when it is kept within the due bounds of the best judgment based upon a thorough knowledge of the facts and within the framework of law and the best academic practice, and financial feasibility.

The procedure for selection of both administrative personnel and staff of the University is based upon advertisements in the press of the positions that are to be filled together with their qualifications, salary ranges, etc. Out of the applications received, a committee selects the three applicants deemed most capable and best suited to the position in question, arranging them in order of merit. From among these, the Board of Regents makes the appointment.

Eleven administrative officers have thus far been appointed

Vice-Chancellor	:	Dr. K. C. Naik, Ph.D., University Bristol, U.K.
Dean	:	Dr. G. Rangaswamy, Ph.D., Rutger University
Director of Research	:	Dr. N. P. Patil, Ph.D., Poona University
Director of Extension	:	R. Dwarakinath, M.Sc., Universit of Tennessee
Director of Instruction (Agr. Hebbal)	:	Dr. M. Puttarudriah, Ph.D., ersity of California

Director of Instruction (Agr. Dharwar)	: Dr. S. W. Mensinkai, Ph.D., University of Reading, U.K.
Director of Instruction (Vet.Sci. Hebbal)	: Dr. R. D. Nanjiah, Ph.D., Washington State University
Registrar	: K. A. Jalihal, M.Sc., University of Tennessee
Administrative Officer	: B. J. Nanjundappa, M.Sc., University of Tennessee
Comptroller	: T. K. Gurusiddappa, M.A., University of Mysore
Director of Student Welfare	: K. Subbaiah, Assoc., I.A.R.I., New Delhi

Others under immediate consideration are an estate offic (Superintendent of Buildings and Grounds) and a librarian.

The Administrative Staff holds a regular meeting for transactio of business every weekday morning from 10 to 11 O'clock, except on holidays. This business of this body is held strictly to matters involving a fair proportion of the officers and in which the opinions or judgment of all is needed. Following this session the Vice-Chancellor meets with individual officers or committees to handle matters restricted to a single area of the University's functions. This procedure is a signal example of the Vice-Chancellor's insistence on efficiency and progress. No aspect of the University's development is allowed to be delayed or mired down.

Upon the Vice-Chancellor's invitation the Group Leader attend each staff meeting as far as possible and participates in the discussions or answers questions as to policy or procedure as or when called upon.

A signal event in the history of the University occurred on October 1, 1965 when the State of Mysore formally constituted the University by transfer of the three existing colleges mentioned above and 38 research stations and farms located in different sections of the State. Hitherto the University was functioning on paper only, with a Vice-Chancellor and a skeleton staff of administrative officers. The formal function of transfer was held both at Hebbal (in the morning) and at Dharwar (in the evening). Principal speaker at the morning exercises was Dr. J. P. Lewis, Minister-Director of U.S. A.I.D. in India. Dr. K. C. Naik, Vice-Chancellor, presented a masterful panoramic view of the University

in graphic perspective as these various transferred units take their places in the reorganization. Governor Giri presided and made pertinent remarks concerning the potential of this University in the State's agricultural economy.

The Dharwar function was presided over by Dr. D. C. Pavate, Vice-Chancellor of Karnatak University. Dr. Mensinkai, Director of Instruction of the Agricultural College delivered the opening address followed by Vice-Chancellor Naik. The formal transfer was made by Sri G. S. Srinivasan, Secretary of Agriculture, Mysore State. Thereafter, the Group Leader invited by the Vice-Chancellor to represent U.S. A.I.D. on the program, gave an address under the title "The Power of Ideas".

Since this memorable event of transfer, highly significant and important events have taken place which typify the systematic development of the University.

1. An intensive study of each of the three colleges, its staff, work load, space, facilities, and needs. The Vice-Chancellor personally spent a full week at each institution for this purpose. The objective of this study was to determine needs for creation of new positions, equalizing the work load, need for additional equipment, transfer of personnel from one department to another where assignment had been made to a field for which the staff had had no training.

2. Adaptation of the recommended "Deans' Curricula for the B.Sc. (Ag.) and B.V.Sc. degrees", which was later approved by the Board.

3. Compulsory Military Training: A far reaching forward step was taken by the UAS in developing and securing approval of making the present N.C.C. (National Cadet Corps) training a requirement for the B.Sc. and B.V.Sc. degrees. Hitherto this training was optional with the student. A total of six trimester credits will be given upon successful completion of the training. Of particular interest is the fact that all instruction will be given by commissioned officers of the regular Indian Army and or Air Force, texts used and examinations conducted similar to the ROTC training in the United States. The Group Leader served as Chairman of the Committee making the foregoing recommendations.

4. Approval of a proposal submitted by the Ford Foundation for establishment of an "Institute for Instrumentation" at the

U.A.S. This Institute is to fill a long-felt need in providing technical assistance in the use, maintenance and repair of scientific equipment to other agricultural universities in India. The function of this Institute is envisaged to be four-fold: (a) to provide training for agricultural university personnel in use, maintenance, care and repair of all types of electrical instruments in a two-year course leading to certification upon successful completion; (b) to provide a repair service for instruments for which spare parts may not be readily available; (c) to design new instruments for experimental use in agricultural research; and (d) to explore the possibilities of their manufacture in India. The Institute will have four sections:

(a) an Electrical and Electronic Section;
(b) an Optical Section;
(c) a Mechanical Section;
and (d) a Glass-blowing Section.

Funds for support of the Institute will be provided from several sources. The Institute will be located on the University Campus and be a permanently affiliated unit of the U.A.S.

Another significant development was the holding of a conferen of superintedents and research men of the various research station and farmers from various sections of the State. This meeting provided opportunity for a critical review of existing research projects with the idea of possible consolidation or termination and the development of new projects. It is anticipated that in th reorganization there will eventually be four regional research stations where work will be concentrated on crops typical of the area. Some of the farms will be converted into demonstration farm under direction of the Director of Extension. Others may become hybrid seed-multiplication farms and others leased out.

PARTICIPANT PROGRAM

The postgraduate training of competent Indian personnel of agricultural and veterinary colleges and research stations in Mysore State for advanced degrees in their respective fields of specialization under the U.S. A.I.D. participant program was carried forward as in previous years.

In the fall of 1965 a group of six staff members chosen by a Selection Committee set up by the State Government of Mysore and

after receiving the necessary approvals and clearances, departed for the University of Tennessee or another American University. The names of the participants with pertinent academic data are listed below:

M. K. Badiger	... for Ph.D.-	Soil Fertility	University of Tennessee
C. A. Khuddus	... for M.S. -	Veterinary Clinical Medicine	University of Missouri
H.M. Nagesha Rao	... for M.S. -	Animal Histology & Embryology	Kansas State University
P.H.T. Reddy	... for M.S. -	Veterinary Medicine-Surgery	University of Missouri
S. Sanne Gowda	... for Ph.D.-	Plant Pathology	University of Missouri
G. Shivashankar	... for Ph.D.-	Plant Breeding	University of Tennessee

One veterinary participant, Mr. A. Malaki, approved for training in Animal Pathology, could not be admitted in an American University during this fall. It is hoped that he will be able to go to the States in January, 1966.

Three participants returned to India during the period November 1, 1964 to October 31, 1965 having fulfilled requirements for the degree as follows:

A. E. Fernandes	...	M.S.	Sheep Production
M. T. Rai	...	M.S.	Animal Husbandry Extensio
T. Seenappa	...	M.S.	Animal Physiology

COMMODITIES

During this report period, the University of Tennessee home campus shipped to the three constituent colleges of the University of Agricultural Sciences, GOI-titled commodities as follows:

Institution	Equipment	Books	Total
Agricultural College, Hebbal	$ 4,162.60	$ 3,245.74	$ 7,408.34
Agricultural College, Dharwar	8,029.87	2,788.30	10,818.17
Veterinary College, Hebbal	5,163.55	4,507.60	9,671.15
	17,356.02	10,541.64	27,897.66

PARTICIPANT SEMINAR

One of the outstanding events of the year was the fourth annual seminar for returned participants who had gone to the U.S. for postgraduate study under the University of Tennessee program. The seminar was held in Hebbal, October 7-9, 1965. Several new features were introduced this year:

(a) The time was increased from 2 to 3 days upon request of many of the participants.

(b) The program was split up into three sections, one on agriculture, one on veterinary science and a third on agricultural economics, agricultural extension and home science.

(c) Two field trips were conducted - one to inspect fertiliz plot experiments with ragi, paddy and hybrid maize, and another to visit a dairy farm and dairy processing plant near Bangalore.

Twenty-five participants presented well-organized and illustrated research papers. Six officials from U.S.A.I.D./Delhi and the Rockefeller Foundation presented papers on timely subjects pertinent to Indian agriculture and university training. Certificates of Achievement were presented to the participants by the Participant Training Branch of U.S. A.I.D.

The Proceedings of the Seminar are presently in press.

MEETINGS ATTENDED

The Group Leader attended the third annual agricultural universities workshop held in Ludhiana at Punjab Agricultural University, February 16-19, 1965 and participated in discussions in the Resident Instruction Section.

The Group Leader attended the annual meeting of the Regional Advisory Committee on agricultural education held this year at the Agricultural College, Vellayani, Trivandrum.

Meeting of the Executive Visitors in New Delhi, February 13-15 1965 was attended by the Group Leader and he presented a Status Report on the University of Agricultural Sciences.

TRANSFER OF TITLE TO USAID TEACHING AIDS

Title was transferred to GOI on equipment furnished the Home Science Advisor assigned to work with Sri Avinashilingam College, Coimbatore. It included a hand operated adding machine, three solar heaters, poultry equipment, six bicycles for extension work.

Title to a Filmac Microfilm Reader-Printer was transferred to the University of Agricultural Sciences.

END-USE AUDITS

End-use audits were made on equipment supplied in past years to the nine institutions which were located in Region V of the University of Tennessee program. Purpose of the audit was to determine the extent to which such equipment is lying idle or is not in condition for use. This report has been submitted to USAID/Delhi. Action has already been taken for transfer of some of this equipment to other institutions where it can be effectively used.

The annual site audit of the University of Tennessee progra financial records was made in January, 1965 and the report was favorable.

VISIT OF EXECUTIVE VISITOR

The executive visitor this year from the University of Tennessee was Dean N. D. Peacock. The Group Leader met him at Calcutta, whence we proceeded to Madras to pay a visit to the Veterinary College and met with returned participants. At Banga conferences were held by him with University of Tennessee Team regarding progress of the program. Visits were made to the Agri culture and Home Science Colleges at Coimbatore and thereafter to the Agricultural College, Dharwar. At each of these Colleges as well as those at Hebbal, the Executive Visitor addressed staf and student body and met with the returned participants. Conferences were held with Dr. K. C. Naik, Vice-Chancellor of th University of Agricultural Sciences and officials of the Mysore Government. Field trips were made to enable the Executive Visitor to observe the result demonstration plots of the Extensi Advisor and the research plots of the Agronomy Advisor on paddy and ragi.

LEAVES BY STAFF

Professor L.N. Skold, Agronomy Advisor, and Mrs. Skold took home leave from December 5, 1964 to January 12, 1965.

Professor V. E. Ross, Extension Advisor, and family took home leave from September 22, 1965 to November 15, 1965.

MISCELLANEOUS

The Group Leader published three articles of a popular nature in magazines published by the colleges in Hebbal as follows:

"The Agricultural University Aims to Increase Agricultural Production in Mysore State" - Souvenir Edition of the Agricultural Alumni Association Magazine, Hebbal, 1965.

"Agriculture - an Honorable Profession" in the College of Agriculture Magazine, Hebbal, 1965.

"Pure vs. Applied Research in an Agricultural University", Veterinary College Magazine, Hebbal, 1965.

A lecture was given on October 20, 1965 before the Bangalore section of the Institution of Engineers on the subject

"Potential for the Utilization of Agricultural Wastes in Mysore State".

AGRONOMY ADVISOR - L. N. SKOLD

The teaching program of the Agronomy Section of the Agricultural College, Hebbal, was continued with but little change from the previous academic year. In September, 1964, one lecturer was sent abroad for postgraduate studies and in May 1965, another was separated from the Department of Agriculture. Neither vacancy was filled. As a result, during the current year the section has operated with only two-thirds of its authorized strength. There were no other personnel changes except that Dr. S. V. Patil, Professor of Agronomy, was transferred in January 1965, to a simil post at Dharwar and was replaced by Professor C. Gopalakrishna who had previously served as Professor and more recently had occupied the post of Agronomist in the Department of Agriculture.

With the anticipated transfer of the college from Mysore University to the University of Agricultural Sciences, it was not possible to effect changes in the Agronomy syllabus or to consider initiation of a postgraduate program. Both of these would have been very worthwhile.

Now that the college is part of the University of Agricultura Sciences and will develop a revised curriculum based on the divisi of the academic year into three trimesters, with internal examinat and a series of course offerings there is an opportunity to study the agronomy syllabus thoroughly and to develop courses that will cover the subject of agronomy more adequately.

The teaching staff of the agronomy section has made some progress toward developing a revised course of study. Much more needs to be done.

It is not likely that the University will consider postgraduate training at Hebbal until the undergraduate teaching program has been stabilized and until library, laboratory and other facilities are strengthened. While it would be desirable to offer postgraduate training at the college, such a program must be developed on a sound basis with a strong teaching staff supported by suitable physical facilities.

RESEARCH

Although the Agronomy Section of the Hebbal Agricultural College has had no formally approved research projects under its jurisdiction and no money allocated specifically for research purposes, a modest program of field research can be conducted with the staff, land, and equipment available.

Ragi and rice are the two major food grain crops grown in southeastern Mysore. Yields of these crops are much lower than would seem to be indicated by the soil and climatic resources of the area. The research program of the Agronomy Section has been directed to investigate the possibilities of increasing the production of these crops.

Preliminary studies in 1963 at the Hebbal Agricultural Research Station showed that dryland ragi would respond to much higher levels of fertilization than had previously been thought possible. On the soils of the research station, the crop did not respond to phosphate or potash but showed an almost linear response to nitrogen applications up to 80 lbs. per acre, the maximum amount applied. During this growing season the rainfall was somewhat below average.

In 1964, the work was expanded to include studies on cultivator's fields in five of the important ragi producing districts of southeast Mysore. The objectives of this program were to teach research methodology to the agronomy staff, to gather data relating to the response of ragi to fertilizers and to create an opportunity for the staff to get out into villages, study the cultivation practices of the region and to exchange ideas with the agricultural extension personnel in the districts. All of these objectives were fulfilled and, in addition, the experiments at the eleven locations served a useful purpose in demonstrating the beneficial effects of fertilizer use to cultivators and extension personnel. Since the rates of fertilizer application were much higher than had been tried previously, cultivators and others were particularly impressed by the fact that no injury resulted from application of large amounts of fertilizer and that yields were more than doubled.

Rainfall during 1964 was above average although at most locations there was a moisture stress on the crop sometime during the growing season. As an average of all eleven experiments, the unfertilized check plots yielded 920 lbs. of grain per acre. The highest yield of 1970 lbs. per acre obtained from an application of 120 lbs. of N and 30 lbs. of P_2O_5. Considering the value of grain and

straw produced at the market prices prevailing at the time of harvest and subtracting from this amount, the cost of the fertilizer applied the following net returns were realized from selected treatments in the experiment: no fertilizer, Rs.300 per acre, 30-30-0, Rs.436; 60-30-0, Rs.499; 90-30-0, Rs.573; and 120-30-0, Rs.575.

Other treatments in the experiments showed that, in this season there was no positive yield response to applied potash, tha there was a significant yield response to 30 lbs. of P_2O_5 in addition to nitrogen, but not to higher applications and that applying all of the nitrogen before sowing or transplanting was slightly superior to a split application.

This work was continued in 1965 at 13 locations in six districts of the state. Unfortunately, however, this season has been one of the driest in history. As a result the dryland ragi crop has been an almost total failure. Less than half of the experimental areas produced any crop at all and, of these, the yields will be from one tenth to one half of normal. It is probal that there has not been such a complete failure of dryland crops in Mysore during the past fifty years.

Less progress has been made in developing better varieties o: ragi than with most other crops. Plans are underway to intensify the breeding work with this crop. It is hoped that Hebbal may become the all-India center for this program. As a preliminary step in such a program, the Agronomy Section grew and studied a collection of more than 850 selections of ragi that had been collected by the Rockefeller Foundation and which constitute the world collection of this crop. This ragi nursery was grown under irrigated conditions during February to June of 1965. The Plant Pathology Section made studies of the diseases that appeare in some strains and classified the collection for plant disease reaction. The Agricultural Botany Section assisted with the classification of strains in the nursery and in the selection of superior types.

Outstanding selections were grown in yield trials under dryland conditions during the main ragi growing season. The Agricultural Botany Section assumed responsibility for growing the entire collection during the main season to compare the perfo mance of the collection during the two seasons. All of these.

however, are total failures because of the unprecedented drought.

Studies were conducted by the Agronomy Section, in 1964, on the response of rice varieties of contrasting growth habits to fertilizer application. One of the varieties included in the studies was Taichung 65. It was the only variety, among those studied, which responded to nitrogen applications of more than 60 lbs. per acre. This variety resembles the Japonica type of rice and was introduced into India from Taiwan in 1951. Apparently its potential as a high producer had not been realized until it was grown under conditions of high soil fertility, since very little work had been done with the variety since its introduction 13 years previously.

In July, 1964, during the monsoon season a study was made with Taichung 65 to determine its response to close plant spacing and high soil fertility conditions. A maximum yield of over 6,000 lbs. of grain per acre was obtained. There was no lodging even with a fertilizer application of 180-90-90. Since the variety is not sensitive to day length the experiment was repeated during the summer season (February to May) of 1965. Similar results were obtained with a maximum yield of 7,000 lbs. per acre. The average yield of rice in the Bangalore area is from 2,000 to 2,500 lbs. per acre.

More than 100 cultivators have obtained seed of this variety for trial on their farms. Its usefulness as a variety remains to be determined but indications are that it may be of real value as a short-season variety in many parts of the state.

To determine whether other varieties may be equally or more promising the Agronomy Section is conducting performance trials with 24 varieties that have been collected in cooperation with the State Paddy Specialist, the Central Rice Research Institute, Cuttack and the Coordinator of the All-India Rice Improvement Project.

AGRICULTURAL EXTENSION ADVISOR - VERNON E. ROSS

INTRODUCTION

An assessment of the work of the Extension Wing at the Agricultural College, Hebbal, at the end of 1964 gave rise to hopes that the 1965 crop year would be a turning point in Mysore's battle with its food problem. Over 16,000 farmers had used chemical fertilizers on their dry-land ragi crops. More than 2,000 field days had been held, giving an opportunity for thousands of farmers to see the miraculous effects of this practice. Everywhere the Advisor and his co-workers travelled in the ragi growing area, farmers were talking about plans to fertilize their ragi crops in the ensuing season. Hopes were further raised after two meetings with leading state officials in December and January in which great importance was attached to this work and plans made to attack the fertilizer supply and credit problems of farmers.

As the planting season approached, however, it became evident that there was to be a serious national shortage of fertilizer. Plans had to be reassessed. The offensive planned with fertilizer as the key weapon was turned into a holding operation.

The personnel of the extension wing were forced to do whatever they could with the resources at hand. The situation resulted in work being initiated with a number of projects.

Following is a description of the activities in which the personnel of the extension wing were engaged during the 1964-65 report period.

THE EXTENSION METHODS COURSE

The teaching program, as in the past, is divided into two parts--classroom teaching and field or village practicals. Greater efforts than before have been made to provide worthwhile training experience for the students. The classroom teaching emphasizes the problem approach as much as possible. Students discuss the problems of farmers and methods for attacking these problems. A great deal of emphasis is placed on student participation. This part of the extension program consumes a large portion of the time of the extension wing personnel. The classroom teaching is a vital part of th

training program designed to provide capable field workers for India's expanding agricultural effort.

The practical training of students is divided into two parts--the weekly visits to villages and a six-weeks' stay in the villages at the end of the school year. Students study farm situations to identify problems. They later set up demonstrations in the farmers' fields which supply solutions to these p oblems.

Most of the field experience, however, is gained by the students through the six-weeks stay in villages at the end of the school year. Operating in teams of threes, the students study the local conditions to determine the major problems. They then choose a course of action and establish demonstrations in cooperation with farmers to illustrate solutions to the problems.

The local village level workers are encouraged to participate in establishing the demonstrations, and the VLW's are urged to check on the work after the students have completed their village camp. The contribution of the students in enlisting farmer's participation in the dry-land ragi fertilization program has been considerable.

Generally the farmers are rather suspicious of the students at first. But when they learn that the students are sincerely interested in their problems, the house where the students live in the village becomes a center of activity.

The contacts made by the students afford an ever-growing audience to which the extension personnel can provide a flow of scientific information which brings the "know-how" of modern scientific agriculture.

THE DRY-LAND RAGI FERTILIZATION PROJECT

The shortage of fertilizer during the 1965 cropping season forced the personnel of the extension wing to curtail their promotional work on the fertilization of dry-land ragi. Contacts were still continued, however, with the block personnel in the ragi producing districts to encourage them to carry on the work of establishing demonstrations and to use them for educating farmers regarding the use of fertilizer on ragi.

Even though promotional work had been slowed down on the ragi program, interest continued to mount. The work expanded into all blocks where ragi is a significant crop. Farmers also fertilized a

larger percentage of their crops.

The severe drought which struck in early October, as a result of the failure of the northeast monsoon, cut yields drastically. It was again proven, however, that it pays to fertilize the ragi crop. Farmers who planted early and fertilized their crops are getting average yields. Those who did not use fertilizer in many cases are experiencing an almost complete failure. Some crops are not even being harvested.

Before it became evident that there was to be a serious shortage of fertilizer, the personnel of the extension wing forecast that 150,000 to 200,000 farmers would use fertilizer on their ragi crops during the 1965 planting season. As it turned out, 46,505 farmers fertilized 212,675 acres of ragi. It would appear from this performance that our estimate was rather conservative.

Strange as it might seem, none of the farmers that have been contacted since the development of the drought condition have indicated any reservations regarding the use of fertilizer on ragi in the future.

HYBRID MAIZE DEMONSTRATIONS

Nine hybrid maize demonstrations were conducted during the dry season of 1964-65. Excellent yields were recorded from all these plots. Table 1 shows the yield data and the economics of this crop

As a result of the field days conducted at the nine demonstrations, forty-two farmers planted 300 acres to hybrid maize during the regular kharif season under well irrigation. Many of these crops have already been harvested and yields have averaged around 40 quintals per acre. Considerable interest has been created in this crop and many farmers are clamouring for seed. The shortage of both seed and fertilizer is hampering the spread of this crop.

If the price of maize continues at or above its present level hybrid maize has no equal under well irrigation. The yields are exceptionally good--exceeding 200 bushels per acre in many cases. So far the crop has not been attacked by disease or insect pests.

The returns from a crop of hybrid maize can be Rs.1,000 or more per acre than for a crop of potato. The calculation below provides an estimate of the change in net farm income per crop by

Table 1. Yield and net return from growing hybrid maize using recommended practices, Mysore State, winter 1964 and Summer 1965.

Village and Farmer's name	Per acre cost of fertilizers and seed	Per acre yield of grain	Value of produce per acre @ Rs.60 per quintal	Net pro: in addition to stover
	Rs	Quintals	Rs	Rs
Udayagiri Ramakrishnarao	141	44.4	2664	2523
Byadrahalli 'Viswaneedam'	146	34.2	2112	1966
Seedehalli Hanumantharayapp	141	44.7	2682	2541
Harohalli Batchappa	141	43.4	2604	2463
Bijwara Venkataswamappa	150	44.5	2660	2510
Chokkanhalli Muddappareddy	165	28.8	1728	1563
Hessarghatta Basappa	151	42.6	2556	2405
Harohalli Anjanappa	151	40.9	2454	2303
Byramangala Narasappa	151	32.4	1944	1793
Average	148	39.7	2378	2230

substituting an acre of hybrid maize for an acre of potato.

A. Added Cost		D. Added Income	
Hybrid Maize Seed	Rs. 24	Maize grain, 30 quintals @ Rs.74.34 per quintal	Rs.2,230
Fertilizer	Rs.150	Stalk (Stover)	Rs. 360
	Rs.174		Rs.2,590
B. Reduced return		**E. Reduced Cost**	
Potato, 50 quintals @ Rs.35 per quintal	Rs.1,750	Seed potato	Rs. 400
		Fertilizer	Rs. 200
		Plant protection	Rs. 50
C. Total (A + B)	Rs.1,924	F. Total (D + E)	Rs.3,240

F - C = Rs.1,316.00

Substituting hybrid maize for an acre of potato gives Rs.1,316.00 more profit per acre per crop.

Maize can be produced during any season making it possible to raise three crops during a twelve-month period. With present yields, 60 or more persons can be fed the year around with the production from one acre.

A few farmers have planted the crop under rainfed conditions. One farmer obtained 10 quintals of maize per acre under the serious drought conditions this past season while he only got one quintal from ragi which was planted at the same time.

The farm manager at Bylakuppa, the Tibetan village about 40 miles west of Mysore city, planted 36 acres of maize under rainfed conditions according to the Advisor's recommendations. He has obtained exceedingly good yields. He expects to harvest 15 to 20 quintals per acre and realize a profit of around Rs.1,500.00 per acre. He plans to plant 1,500 to 2,000 acres this next kharif season to hybrid maize.

There is enough evidence to warrant the testing of hybrid maize under rainfed conditions to see if it should replace the low producing ragi crop on the deeper soils and in some of the heavier rainfall areas of Mysore State.

DEMONSTRATIONS CONDUCTED IN COOPERATION WITH OTHER AGENCIES

1. Nineteen demonstrations have been established in cooperation with the Indian Potash Institute to further study the effects of potash on dry-land ragi yields.

2. Five demonstrations have been established in cooperation with Rallis India Limited to test the effect of ammonium phosphate on ragi yields.

3. Five plots have been established in cooperation with Dr. Shastry of the Plant Physiology Department at Hebbal to test the effects of micro-elements on ragi growth.

The previous work with potash had given raise to the idea that potash may have a depression effect on ragi yields at some of the locations. It is thought that this situation might be a result of some minor element deficiency. Five of the potash demonstrations have been sprayed with a solution containing minor elements to determine if this will affect the yields. Due to the drought which reduced yields drastically no conclusions can be reached as a resul of these experiments.

DEMONSTRATION WORK WITH TAICHUNG 65 PADDY

Fifteen demonstrations have been established with Taichung 65 paddy using 60-60-40 pounds of NPK to test the response of this variety under farm conditions and with a heavier application of fertilizer than what the farmers generally use on paddy in this are All of these plots are looking exceedingly good and field days are being conducted to show the plots to as many farmers as possible. This variety has been tested under very high fertilization, up to 180 pounds of nitrogen per acre, without any significant lodging. It apparently offers a great deal of promise as a variety with potentiality of higher yields through the use of fertilizer.

INITIATION OF FARM ADVISORY SERVICE

The number of inquiries by mail increased tremendously this past year. Requests come to the Extension Wing for information abc the fertilizing of various crops and how to grow hybrid maize, Taichung paddy and hybrid jowar. The pressure of answering these letters has become such that the personnel of the Extension Wing are engaged in the publication of several leaflets which will provic

information on questions generally asked. It is anticipated that this service will become more important as the Extension Wing becomes better known. It is believed that with the take-over of the college by the University one of the most important functions of the new extension department will be to answer these kind of requests. It is absolutely impossible to visit all of the farmers from whom requests come.

COOPERATIVE WORK WITH THE COLLEGE BLOCK

As in the years past a great deal of effort has gone into the cooperative work with officials and extension workers of the local college block. The personnel of the Extension Wing attends the monthly meeting of the taluk board and assist with planning of the agricultural work of the block. In the past, most of the work has been built around the fertilization of dry-land ragi. This year the block was able to enlist 1,500 farmers to use fertilizer on their dry-land ragi. Although it is too early to determine the exact acreage, it is now known that there will be a sizeable increase in the acreage of ragi fertilized in the college block this year inspit of the serious shortage of fertilizer.

In addition a number of farmers in the block have planted hybrid maize during the year and interest in this crop is spreading.

THE TRACTOR PROJECT

Efforts have continued this past year to conclude the collaboration agreement between an Indian entrepreneur and the Beaver Tractor Company in New Hartford, Connecticut, U.S.A. to produce a small tractor suitable for Indian conditions. The Indian party expects the import licence to be issued shortly for the import of two tractor with complementary equipment to be tested and approved by the Department of Agriculture in order to proceed with this project.

IN-SERVICE TRAINING OF AGRICULTURAL EXTENSION OFFICERS

The in-service training of the AEO's, agricultural demonstrators and cooperative officers continues to be an important part of the extension program. Time would permit the holding of only two schools during this past year. Training courses were held for Chitaldurga and Chickmagalur districts which completed this training for the ragi producing districts. This brings the total to nine one-week schools which have been conducted in the ragi producing districts.

In addition to the two one-week schools conducted this year, one-day training sessions have been held for the extension officers in Belgaum, Bijapur, and Dharwar districts. These districts plan to develop a fertilization program on dry-land jowar. The methods which had been used in the ragi area were explained in the hope that they would be of value to these districts in their work with jowar. No assessment of the progress of this work has been possible. The work, however, has been seriously limited because of the fertilizer supply situation.

COOPERATIVE WORK WITH OTHER ORGANIZATIONS

Cooperative work with other organizations and institutions has become an important part of the extension advisor's work. Assistanc has been rendered to the Gramsevak Training Center at Mandya, the Orientation and Study Center at Mysore, the National Dairy Research Institute, Bangalore, the Mysore Animal Husbandry Department and others. Much of the assistance has been in aiding these organizations in training work associated with their development programs.

A "crash" program to increase the milk supply of Bangalore has been initiated in an area within a 60 mile radius of the city. Several conferences have been held with the personnel of this progra in assisting with the organization of the work.

A project to produce and test the value of corn silage harveste under different conditions has been carried out in cooperation with the Animal Husbandry Department and staff of the Mysore Veterinary College. Plans were to determine if hybrid maize could be grown successfully under rainfed conditions and to determine the economics of different methods of harvesting the maize crop.

One plan was to harvest and sell the green cobs as roasting ears, and ensile the green stalk; another method was to harvest both the grain and stalk for silage at the recommended stage of maturity (late dow stage); the third method was to harvest the ears when they were mature enough to make shell grain and ensile the stalk.

Due to the severe drought the idea of growing the maize under strictly rainfed conditions was abandoned. Approximately four of th ten acres planted had to be harvested as silage when in the tasselin stage. Irrigation water was applied to the remaining six acres.

The first alternative to harvest the green cobs as roasting ears and ensile the green stalk was also abandoned. However, the remaining crop has been harvested as planned, to test the other two methods of handling the crop and feeding trials will be conducte as planned.

COUNSELLING WORK

The extension advisor devotes a considerable part of his time to counselling work with students, staff and government officials. This is an important activity. Good working relations are essential and can be maintained most effectively by proper counselling with those whom the program seeks to serve.

FUTURE PLANS

The take-over of the work of the Extension Wing by the Mysore University of Agricultural Sciences means that the extension advisor responsibilities will change to that of assisting the Extension Director in organizing and implementing the extension program of the new University. Every effort will need to be made in organizing coordinating and utilizing the resources of the University, Departme of Agriculture and Community Development in the attack on the proble of Mysore farmers.

A tremendous task still exists to train the necessary personnel and to direct their activities in implementing an effective extensic program. The details regarding the best procedure to follow in this matter still remain to be worked out. The speed with which these problems can be attacked depends to a great extent upon the financia arrangements and the number and quality of personnel made available.

The sense of urgency that seems to exist at the University regarding these problems certainly lends support to an optimistic outlook that these problems will be attacked and solved.

FARM MANAGEMENT ADVISOR - H.A. HENDERSON

TRAINING AGRICULTURAL ECONOMICS STAFF

Formal Training for the Agricultural Economists was conducted at the Agricultural College, Hebbal, in cooperation with the Indian Society of Agricultural Economics, the Agricultural College, the Farm Management Research Centre, and other Educational Institutions. The school for 20 economists throughout India, doing research and teaching, gave basic training in the simpler research tools, especially farm records and budgets, that are used in decision making. Advanced training of Indian economists often includes the most advanced techniques being taught in more developed countries but skips many basic principles needed for sound research, teaching and extension. This course was an attempt to fill this gap. Three participants including two Lecturers in Agricultural Economics were from Mysore State. The Farm Management Advisor, Agricultural Extension Advisor, Dr. N. P. Patil, now UAS Research Director, B.V.S. Baliga and S. B. Tambad from Mysore State were on the panel of instructors. The Agronomy Advisor was one of several guest speakers.

Service to others is the major purpose of an economics staff. Opportunities for training in service to the public were found in many ways:

1. An Agricultural Development Seminar was held at Hebbal at the request of the Union Ministry of Food and Agriculture. Leading farmers, state government officials, agricultural economists, and leading citizens from 4 southern states participated. Economists from Mysore State, the Indian Society of Agricultural Economics and the Central Government provided technical resource persons while the UAS provided facilities and made local arrangements. The group studied some of the problems and proposals of the Fourth 5-year Plan for agriculture and made specific recommendations to the ministry.

2. Helping economists teach a school in farm management at the Young Farmers' Training Center, Ramakrishnapur provided training in giving knowledge to farmers. This is reported to be the first major effort of local research workers and lecturers to carry their information to farmers. Every agricultural economist in the Bangalore area participated in some way. While the first effort lacked much in quality, it did give the instructors a broader

concept of their own responsibility and purpose. It helped them to understand better the needs of farmers whom they are supposed to serve.

3. Service to others was carried out in many other ways, particularly by talks to other groups. The Farm Management Advisor gave talks to several groups including a convocation of the Cooperative Training Center, a Seminar for Post-graduate Students and Faculty at Central College of Bangalore University, a Training Course for Extension Officers and the Training Center of the Indian Institute of Social Studies. The advisor was accompanied and assisted by an Indian counterpart.

Counterparts were also active in public service appearances. For example, Dr. Patil was a frequent contributor to All India Radio and other audiences. Mr. B.V.S. Baliga and others gave technical advice to the Speaker of the Legislative Assembly in planning a Development Potential study in the South Kanara Area.

Personal Counselling and Informal Instruction is often the most effective way of training highly specialized personnel. Critical review of manuscripts at the request of the authors presented many practical teaching opportunities. Workers are receptive to teaching when they are facing real problems of their own. The teaching aid is present, the "student" recognizes a need to learn, and the subject is relevant to the "student's" real world. At least 15 research manuscripts, eight of which were acdepted for national journals, were reviewed in these conferences. Other personal counselling and informal instruction involved the selection of technical books for the library, discussing different teaching methods, reorganizing economics curriculum, establishing new research projects, selecting equipment, improving data analysis procedures, planning for post-graduate training, etc. The advisor tried to be available for anyone who sought his help. This was the most satisfying and possibly the most effective of th advisor's activity.

INSTITUTION BUILDING

Trained personnel are frustrated and their efforts are futile unless adequate institutions provide a medium through which they may work.

The Farm Management Research Center was organized in 1959 under the leadership of UT-U.S.A.I.D. personnel and the Agricultural Development Council. Dr. E. J. Long, then group leader, and Dr. Russell Olson, then Agricultural Economics Advisor, Ohio State team, assisted the Mysore Government to establish the organization for the first research in rural social sciences in the state. After the organization was established, and with the advice and assistance of Dr. M. B. Badenhop, the center accumulated enough data to begin publication in 1963. Since then at least 15 articles have been published in national journals besides the publications of the center and many local and state popular articles. The present advisor has assisted the staff in improving the quality of the work and in recognizing more practical uses for their work. In the past, most research has consisted of collecting, analyzing, and reporting data from the past. Personnel of the center were beginning to expand their work into activities to directly help farmers make welfare-improving decisions. During the year the staff began actively developing plans to assist farmers directly in making income-improving decisions and to train extension workers to teach management skills to farmers. Since the center was not transferred to the UAS, these plans are of little use. Also, work with the center is no longer a direct objective of our program.

Work on selection committees was a direct contribution to building the UAS as an institution. Service of any institution cannc exceed the quality of its members. The Farm Management Advisor was chairman of two committees to examine applicants for posts such as office superintendents, assistants, cashiers, stenographers, etc. From over 150 applicants about 35 persons recommended by these committees have been appointed. The Advisor also served on committees to examine applicants for posts of Librarian, Estate Officer and Director of Student Welfare.

USE OF KNOWLEDGE FOR SOLVING PROBLEMS EMPHASIZED

.luch of the effort to improve both research and teaching wa to encourage use of synthesis methods that use established knowledge to solve problems in addition to analysis methods alre used. Some examples from a recent research report will illustra this difference.

Analysis work of the past is illustrated first. Table 1 shows that under given conditions farmers that had used water to produce paddy and chillies produced less food per unit of water

Table 1. Productivity of an acre-inch of water used on different irrigated crops, Bangalore District, 1959-62.

Crop	Production from an acre inch irrigation water		
	Product	Digestable Nutrients	Net income
	Pounds	Pounds	Rs.
1. Transplanted Paddy	28	11	4
2. Irrigated Ragi	117	101	18
3. Cabbage	631	45	40
4. Garlic	128	43	22
5. Chillies	48	4	1
6. Potato	324	69	20

than when the same amount of water was used on other crops. They also received less net income from water used on paddy and chillies than from water used on other crops. Likewise, table 2 reports the net income, food nutrient production, and net income of a representative farmer in the sample. These findings are valuable knowledge of the past, but do not solve future problems.

Table 2. Farm Plan of Representative Farmer, Bangalore District, 1959-62. Producing Paddy, Cabbage, and Garlic.

Crop	Area	Water used	Income over variable costs	Digestab. Nutrient produced
	Acre	Acre-inches	Rs.	Pound
Transplanted Paddy	1.65	125	470	1380
Cabbage	.40	8	320	360
Garlic	.15	3	60	130
Total	2.20	136	850	1870

An example of synth esearch methods is given in Table 3. It estimates that if the representative farmer should shift crops from low-producing ... low-income paddy and garlic to more productive higher-income irrigated ragi and cabbage, he could improve his income by Rs.200 in the same season. In addition he would conserve 92 acre inches of water for other uses and would more than double the food nutrients he produces. (For additional details see Patil, N.P. and B.V.S. Baliga, Increasing Incomes to Water in Red Soils Area, Bangalore District, Mimeo report, Farm Management Research Center, Hebbal. Some data different from original due to rounding.)

Table 3. Alternate farm plan for Representative Farm, Bangalore District, to produce Irrigated Ragi and Cabbage.

Crop	Area	Water used	Income over variable costs	Digestable Nutrient Produced
	Acre	Acre-inch	Rs.	Pound
Irrigated Ragi	1.65	33	600	3330
Cabbage	.55	11	450	500
Total	2.20	44	1050	3830
Change from present (Table 2)	0	92 Saving	200 Increase	1960 Increase

Only when knowledge is directed toward solving problems of people in the future does it become useful and serve its purpose. This is the essence of economics; the justification of the discipline being different from the simpler biological and physical sciences.

Problems demonstrating use of synthesis to improve farm income were prepared and demonstrated to the Lecturers using different audiences such as general public, farmer groups, college students, and professional economists.

ECONOMICS TRAINING PROVES PRODUCTIVE

Over half of the participants who were trained in agricultural economics produced technical papers for the returned participants seminar. This is more than twice the average of other disciplines. Papers were invited from all UT-U.S.A.I.D. participants with useful research results made possible by training in the states. Those with economics training responded at twice the rates of others.

The benefits of economics training were not retained for the profession alone. The papers by economics-trained persons were divided about equally between the economics section and other sections. Many of them are assigned to leadership positions in other fields.

POST-GRADUATE TRAINING NEEDS FOUND CRITICAL

A need for postgraduate training in agricultural economics and other social sciences is critical for Mysore State. The recognized need for research and teaching-positions in agricultural economics is about four times the number now within the state. This is the number by which research and undergraduate teaching positions approved by Central Planning Commission and State government for the Fourth Plan, exceed present holders of advanced degrees. Further, most of the present degree holders are assigned to responsible positions in other fields and are not likely to be available for positions in economics. Even if an output of 10 Masters per year were to begin immediately, the present need for research workers would not be met in the plan period. This shortage exists at the same time Ph.D. holders in other fields serve in sub-professional ranks and hope for opportunities to use their training. According to Planning Commission reports the shortage is nation-wide and chronic.

VETERINARY SCIENCE ADVISOR - G. K. GARLICK

Soon after my arrival in Bangalore the Group Leader arranged for me to meet the college officials, also several government officials who were concerned with the efforts of the University of Tennessee program. These introductions proved very helpful to my early orientation.

Having been informed earlier of the August 21 inauguration of the University of Agricultural Sciences I was surprised to learn, after arriving in Bangalore, that the colleges had not yet been placed under the control of the University and that the changes, in the veterinary college, which would be essential to progress would not be possible until after the transfer had taken place. This situation, although somewhat disappointing automatically presented the opportunity to carefully study the existing conditions and arrive at well grounded suggestions for later improvement.

During my contact with the Mysore Veterinary College, at Hebbal I have become well acquainted with many aspects of the administration and teaching. As a result of this study I offer the following observations and statements with the hope that they may be useful in planning the future development that is anticipated under the present administration.

The first and most important task before the veterinary faculty is the development of at least the general form and schedule of the future curriculum. This must rank first in order of priority as such programing is prerequisite to the orderly development and planning of overall requirements.

Careful attention must be given to the correction of the existing duplication and overlap in the teaching of veterinary medicine, agriculture, and animal production. Due to the massive and rapidly increasing volume of scientific information available today in every subject area, it is imperative that an early move be made to restrict the breadth of the veterinary curriculum to a manageable dimension in order that a student will have some chance of acquiring adequate depth, and that upon graduation he will be clearly identified as to profession and purpose. In the present program academic emphasis greatly overbalances practical application. This is particularly evident in clinical medicine, surgery and obstetrics. These subjects become obvious in such a consideration

because their principal objective involves practical application. This lack of attention to techniques is in relationship to the lack of facilities to practice such techniques.

The scheduling of time applied to the various aspects of a complete and well designed curriculum should have as its foremost objective a rational balance between principles and techniques, if we are to expect the graduates of such a program to attain the versatility and adaptability that the future will demand.

Pre-professional training is at present being given in the veterinary college. This is an added and unnecessary burden on a faculty which should be allowed to devote its full time and facilities to the teaching of the professional courses and the operation of an up-to-date teaching hospital. All pre-veterinary courses should be offered in the common facilities of the university and the program should be, as far as possible, common to the basic requirements for the first year of other degree courses in the institution. This will help to avoid duplication and provide an additional year for the student to decide his ultimate goal.

Entrance requirements to the professional program in veterinary medcine are not of sufficiently high standard. Easy entrance, large classes and mediocre academic standards attract poor students. This can be corrected by rejecting such applicants. The real problem, however, is one that cannot be so easily solved--for the existence of the very conditions that attract poor students are also highly effective in repelling the excellent and desirable students.

All attempts to improve the overall quality of veterinary education, regardless of expense and sincere effort, will fail if entrance requirements are not commensurate with the desired quality of instruction and ultimately the expected professional competence of the graduated student.

The number of students accepted each year is far in excess of the capacity of the physical plant, equipment, and available clinical material. With major improvement in the physical plant, utilities and equipment, followed by an effort to utilize these advantages in attracting an increased volume of clinical material it appears feasible for the institution to provide good training for a maximum of 40 students per class. India, having by comparison to other countries, a relatively large number of veterinary colleges should feel no need to accept students in numbers beyond that to which quality instruction can be provided.

The existing library is in need of complete reorganization as to the method of operation. The inventory of books is inadequate and foreign journals are not received at all. Enlargement of the library inventory to a satisfactory level and provision of reading tables would require considerably more space than is now provided.

The development of the veterinary library will require the employment of a full time person with training and experience in medical library organization and operation.

Some definite arrangements must be made for the procurement by students of the basic standard texts. This would involve a minimum of 40 books per student during a four year period. Provision of a large supply of basic texts in the library is of course better than none at all, but I feel that every effort should be made to arrange for students to have their own books and for them to retain them when they graduate.

The experience of the present staff, collectively, represents a number of years of experience in American veterinary institutions. The requirements that I have suggested for the future of the institution are not new to many of them, nor is the part they must play in the sucessful operation of such a unit. I am confident that they possess both the ability and necessary attitude to make definite progress toward the objective.

FAREWELL STATEMENT OF GROUP LEADER

The present Group Leader's tour of duty is soon to end, and he will depart with his wife to the United States on December 15, 1965. Upon invitation from the President and Dean of Agriculture of the University of Baghdad, Iraq, one month will be spent in Baghdad for consultations with the Agriculture Faculty on both teaching and research. The Group Leader served that institution in 1952-53 under the former University of Arizona/ICA/Iraq program. A number of his former students are members of the staff there. A visit will also be paid to the University of Pahlavi, Shiraz, Iran where the Group Leader was advisor to the College of Agriculture under sponsorship of the Ford Foundation.

As for the University of Agricultural Sciences, Bangalore, the circumstances and progress thus far made under an administrative staff of highly competent officers of excellent training and long experience points to a great future for the institution. With the adoption of the trimester curriculum and the internal grading system in operation, great strides in the upgrading of instruction in both agriculture and veterinary science will be made and the intensification of both research and extension efforts will assist in speeding up agricultural production in Mysore State. A survey made by the University of Tennessee team of advisors to the Thungabadra irrigation project and which eventuated in a report submitted to the Vice-Chancellor will provide suggestions for pertinent and necessary research projects which could help speed up the agricultural development of that potentially productive area.

In departing from India and leaving this tremendous challen presented by the developing U.A.S., the Group Leader wishes to express his sincere thanks to all members of the U.A.S. administ staff and faculty as well as officials of the Government of Myso State for their interest in and appreciation of his efforts in behalf of the University. He will always follow the future prog of the University with most intense interest, in the steadfast anticipation that if the present solid and constructive program o development is continued, this University might well become one of the leading agricultural institutions of South Asia.