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Institute of Agriculture and Animal Science

of the

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MUCIA

Midwest Universities Consortium for International Activities

IAAS Faculty Project for Strengthening Agricultural Research

INSTITUTE OF AGRICULTURE AND ANIMAL SCIENCE

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PREFACE

A new farmer-oriented research program is underway. Until recently, the Institute of Agriculture and Animal Sciences has been able to commit only small amounts of funds to support research. At the same time, more than forty faculty members have received graduate level training, often with a strong research emphasis, abroad. And twenty more faculty members will return to the Institute over the next two years.

To meet this critical financial limitation and to more firmly establish a professional commitment to continuing research among IAAS faculty, new funds have been set aside under the MUCIA program. These funds have proven to be a great stimulus to research, demonstrating in a relatively short time that appropriate incentives will stimulte the latent research talent located at IAAS and move the Institute's research program forward. This represents an enormous potential for addressing the agricultural needs of small farmers in the Chitwan area.

Appendix I attached to this report contains general supplementary guidelines to the Revised Research Proposal Form for IAAS Research originally, dated 9 March 1981. These guidelines have been reviewed by AID officials and IAAS administrative personnel and are intended to direct scholarly review of research proposals as well as to meet contractual requirements for accountability of funds. Appendix II attached contains a complete list of the reports approved to date under this program.

SOYBEAN RESEARCH AND EXTENSION IN CHITWAN

A RESEARCH PROPOSAL

Prepared by:

K. P. SHARMA

SOYBEAN RESEARCH AND EXTENSION IN CHITWAN - A PROPOSAL

K. P. SHARMA

Soybean (Glycine max (L) Merrill) is a good source of protein and Calony, and is meat for poor people in underdeveloped countries such as Nepal. Mature, dry soybeans contain an average of 40% protein, very high compared with 3.5% protein in cow's milk. Aminoacid balance of soybean is better than any other common vegetable source of protein and approaches FAO dietary standards for protein (2). Animal protein is too expensive for the majority of Nepalese people. The conversion of vegetable protein to animal protein is highly inefficient, as for example, with highly efficient broiler chickens, five pounds of vegetable protein is consumed to produce one pound of animal protein (3). Soybeans also contain about 20% oil of which about 85% is unsaturated and cholesterol-free, making it highly desirable in the human diet. Presently, direct use of whole soybean is the best answer in augmenting protein and calories required in a balanced diet lacking in millions of Nepalese. If whole soybeans were made available and added to the diet with cereals rich in sulfur-bearing aminoacids, the problem of protein malnutrition and calories required would be immediately solved.

Soybean is a potential crop of Nepal as it is in other tropical, sub-tropical, and temperate regions of the world. Soybeans have great potential in Nepal, both in terms of production environments (agroclimatic conditions) and the market being created. From 1972 to 1976, the area under soybean production in Nepal increased from 18,040 to 18,530 hectares to an estimated 70,000 hectares in 1981. From 1972 to 1976, the metric tons increased in production from 10,824 to 12,044 to an estimated 45,500 metric tons (1). Average yield per hectare has increased from 600 kg. to 650 kg. and more from 1972 to 1976. The wide use of soybeans in different forms in Japan, the U.S. and India is

obvious. Its importance in the formulation of animal and poultry feed cannot be overlooked. Importance of soybean in human and animal nutrition has recently been recognized in Nepal. For example, in Hetauda a soybean oil extracting unit is established at Narayangarh beside a vegetable ghee factory built earlier. Private poultry industries are beginning to demand high quality feed. High demand for feed will stimulate feed industries, creating markets for soybean supply. The dietary habit of Nepalese people can be changed slowly by adding more soybean in different forms to regular Nepalese diets ultimately augmenting the nutritional value of diets.

Soybeans are indigenous to the hill agriculture of Nepal. For many years farmers have been growing soybeans on a small scale in the hills and foot hills. Traditional to the Nepalese farming system is the cultivation of soybeans on less fertile soil generally rejected for the cultivation of maize and other crops of local importance. Also soybeans are cultivated on rice paddy bunds and side bunds. Soybean cultivation has extended from the hills and foot hills to the inner Terai and Terai regions of Nepal along with the migration of people from the hills to the Terai. The varieties of soybean grown by local farmers vary widely in seed size from very small to large, color (black, brown, white and almost red), and probably in protein and oil content. The same varieties grown in the hills are grown in the Terai.

The local soybean genotypes grown in Nepal are indeterminate in growth habit, require about six months to mature, and are low-yielders. Average soybean yields in the United States have increased from 760 kg./ha. in 1924 to 1,863 kg./ha. between 1971-73 (6), and a record of 4,452 kg./ha. is also reported. A 145% increase in soybean yield in 47 years in the United States is due to changes in environment and genotypes (5). The case for soybean production in India has been similar. Indian farmers had been growing some soybean for many years but more Indian farmers could not be convinced to grow

it primarily because of low yield, long duration of maturity, and the planting of small, inferior black seeds of local varieties (3).

A breakthrough in soybean production in India occurred after 1965 when U.S. bred golden-colored large-seeded genotypes were introduced and selected for adaptation and higher yield. The promising genotypes were selected and extended to different regions for commercial cultivation. Pantnagar University led the study for this regional cultivation, cooperating with the INTSOY program of the University of Illinois. Soybeans in India have now become commercially important. Area under soybean cultivation and production per unit area in Nepal can be increased if the Grain Legume Improvement Program (GLIP) and Institute of Agriculture and Animal Science work hard in cooperation with INTSOY and AVRDC. The collection of local land races, the introduction of promising genotypes and their evaluation and selection on the basis of location specificity with a proper extension program will also bring a soybean revolution to Nepal.

This project, Soybean Research and Extension in Chitwan, is divided into six parts. The first four parts, ABCD, are research projects, and EF are related to germplasm collection and seed multiplication for the extension program. Seeds will be multiplied to make them available to the farmers in the next cropping season. The assignments for the proposal are as follows:

Personnel Involved in the Project

Director - Mr. K. P. Sharma - Plant Breeder

Collaborators:

1. Mr. S. M. Shrestha - Plant Pathologist
2. Mr. S. P. Katei - Agronomist

3. Mr. S. B. Gurung - Extension Coordinator
4. Mr. S. C. Sah - Soil Scientist
5. Mr. R. Poudel - Agronomist

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PART A

Research Title - Effect of Seed Moisture Content, Duration of Storage and Seed Container Upon Seed Viability of Soybean in Chitwan.

Collaborator - S. M. Shrestka

Introduction: A good viable soybean (Glycine max (L) Merril) seed is most important for a good initial plant stand in the yield for successful production. Seed quality characteristics are among those most needing attention, especially when production is based on the cultivars of U.S. origin and is extrapolated for the humid tropics (Whighaur et al. 1978). Bharti (1980), and Sharma (1982) reported difficulties encountered for soybean production in the Terai regions of Nepal due to reduced seed germination associated with loss of seed viability.

Many seed-borne micro-organisms are associated with loss of seed viability. However, Wilcox et al. (1975) found no significant effect of purple seed stain on agronomic characteristics and final seed yield of soybean. Edwards et al. (1971) and Pinthus et al. (1979) found seed yield per plant to be correlated with speed of germination, but not with the size of the seed. Rapidly germinating plants had a higher rate of dry matter accumulation, produced more pods per plant, matured earlier, and had shorter periods from seedling emergence to maturity. Plant survival in the field also increased with speed of germination, thus promoting seed yield.

Soybean seeds are very sensitive to storage conditions and easily lose seed viability. Other than genotype selection, initial seed moisture content, relative humidity of storage, duration of storage and contact of seeds to the outer atmosphere are the important

factors responsible for the loss of seed viability. Ravalo et al. (1979) concluded that a fairly high level of germination can be maintained for three months of storage in all types of containers. For longer storage periods, germination was strongly affected by storage containers, with seed germination dropping to zero after nine months of storage in cloth bag containers. Soybean seeds without much drying stored in sealed metal cans and unsealed metal cans with one mil plastic lining preserved germination above 80%. Seeds stored in fertilizer jute bags with one mil plastic lining and cotton cloth bags had low germination. They further concluded that low initial seed moisture content and its maintenance throughout the storage periods are very important to preserve seed viability. This is particularly important under hot and humid conditions which cause the dry seed to absorb moisture from their surroundings until the seed moisture content is in equilibrium with the atmosphere.

Farmers have traditional ways of storing seeds just after threshing. Therefore, the high initial seed moisture content and hot and humid storage conditions of Chitwan cause the seeds to lose viability. The objectives of this experiment are, (i) to study the effect of initial seed moisture content, (ii) to study the effect of seed container, (iii) to study the effect of genotypes on seed quality and viability under Rampur conditions, and (iv) to develop a suitable seed storage technique practical to local farmers.

Hypothesis

Low initial seed moisture content and seed storage conditions are more critical factors than genotypes and duration of storage to preserve soybean seed viability.

Duration - This experiment will start in March, 1982, and end in December, 1982.

Materials and Methods

A. Genotypes:

1. P28 - has good quality seed
2. Bragg - widely cultivated all over the world
3. Hardee - has poor quality seed

B. Initial Seed Moisture Content:

1. 13%
2. 10%
3. 7%

C. Containers:

1. Cotton bag in open air
2. Cotton bag in sealed tin (air-tight)
3. Cotton bag in sealed earthen pot
4. Air tight plastic container

300 grams of seed will be used for each experimental unit. There will be three replications. Seed viability will be tested by placing 100 seeds of each replicate of every treatment on moist paper in a germination tray after three months. At six months towelling will occur. There will be a total of nine months of storage after which a visual scoring in and on the seed infected by micro-organisms will also be made. The data will be analysed in a split-split plot design.

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PART B

Title of the Project: Study on Yield Stability of Promising Soybean Genotypes in Farmers' Fields at Different Locations in Chitwan.

Collaborator: S. P. Katel and S. B. Gurung

Introduction: Soybean Glycide max (L.) Merrill genotypes respond differently according to the environment and management practice created. Whigham (1975) found a difference in yielding ability of genotypes at different environments and concluded that exploitation of yield potential of soybeans under different climatic conditions will require better understanding of how environmental and management variables influence yield. Beaver et al. (1981) and Sharma (1982) reported an average seed yield response from determinate and indeterminate genotypes to environments of varying levels of productivity, suggesting that the selection of genotypes with more stable performance might be possible. Sharma (1982) with two years of field experiments at two locations reported Bragg, P23, Cobb and Bosier as being more stable and promising for the Rampur agroclimatic condition. Choudhary (1982) has examined a one-year experiment at Khumaltar and Sharma (1982) has examined a one-year experiment at Rampur, and they have both recommended Desoto, Celest and Crawford as promising lines for further testing.

Since some soybean genotypes are known to perform differently even with a slight change in management and environment, further testing of promising lines under different management practices within the same agroclimatic zone is necessary to confirm yield stability. The production environments created at research stations are more artificial and are generally favorable even for poor genotypes than genotypes in farmers' fields where the new materials will be grown. Therefore, the research results obtained from

research stations deviate from reality. Varieties recommended on the basis of performance under research conditions do not perform as well in the farmers' fields. Varieties evaluated on the basis of performance in farmers' fields and recommended for cultivation by general farmers are more likely to show stability for yield.

This experiment is designed to, (i) study the effect of genotypes and location for soybean yield performance, (ii) test the yield stability of promising genotypes, and (iii) draw conclusions on the importance of evaluating promising genotypes in farmers' fields before recommendation.

Justification of Need

This experiment is necessary to test and confirm the yield stability of promising genotypes at different locations before they are released and distributed for general cultivation in Chitwan. This type of farmer field-oriented testing program will provide farmers opportunity to learn about soybean cultivation and to compare the local material with the improved type. The same experiment could be used as a demonstration plot, and further demonstrations may not be needed.

Hypothesis to be Tested: - Genotypes promising at one location perform equally well at different locations, but within the same agro-climatic conditions provided that management factors are kept constant.

MATERIALS AND METHODS

A total of eight genotypes, one local and seven non-local, will be tested at four locations.

Genotypes	Locations
1. Bragg	1. Rampur
2. P28	2. Lanku
3. Cobb	3. Ratnanagar
4. Bosier	4. Bishnupur
5. Desoto	
6. Celest	
7. Crawford	
8. Local check	

Replications - Three

Plot Size - (i) Gross - 5m x 2m

(ii) Net - 5m x 1m

Design - RCBD

Spacing - (i) Inter-row - 50 cm

(ii) Intra-row - 5 cm

Fertilizer -- 20:60:30 kg. N: P_2O_5: and K_2O/ha. Seeds will be inoculated with Rhizobium jabonicum

Planting Date - Second week of June, 1982

Land area at one location - 20 x 20m = 400 sq. meters

MATERIALS

Material		Quantity
1.	Seed bags	1000
2.	Seed planter (hand driven)	1
3.	Fertilizer	-
4.	Bacterial Inoculum	-
5.	Land rent 3	
6.	Insecticides	
7.	Harvest sacks 130	
8.	Sample bags (cloth)	130
9.	Aluminium Tags	
10.	Transportation cost for frequent visit at research sites	
11.	Labor at four locations 150 x 4	
12.	Research assistant	
13.	Data analysis and publication	
14.	Contingency	

PART C

Effects of Planting Date and Stage of Maize Crop Development on Soybean Genotypes Under Mono- and Intercropping

Collaborator - S. C. Sah

Introduction: Soybean Glycine max (L) Merrill genotypes differ in growth habit, plant height, period to physiological maturity, and seed yield compared with other genotypes. All of these factors are modified by date of planting. However, genotype is the only factor responsible for number of pods per node and seeds per pod and is not affected by date of planting. Yield response of soybeans to different dates of planting is primarily based upon the period available for vegetative and reproductive growth, and these times differ in periodic photo response which in turn affects each genotype differently (Sharma 1982). Taller plants at flowering, longer internodes, early canopy closing date (Sharma 1982 and Gat et al. 1980) and increase in the number of axillary nodes produced (Patterson et al. 1977) are related to increased yield in the late planted environments. Hartwig (1970) has suggested a required period of at least 45 days before flowering to obtain sufficient plant growth for high yield. On the other hand Black (1976) as cited by Carter et al. (1979) has concluded that either longer or shorter reproductive periods may be associated with high yield depending upon genotype.

Soybean intercropping with corn is a common farming system in the hills. Both corn and soybean exert pressure on each other for space, nutrition, and solar radiation when planted together. The degree of success in obtaining extra yield by intercropping over monocropping of either soybean or corn depends upon the mutual adjustment between the different developmental stages of the two crops grown together. The ability of

genotypes of two crops grown,[1] height and duration of vegetative and reproductive growth as well as spacing between two crops can produce maximum yield if crops are managed in such a way that there is minimum pressure exerted by one to the other for nutrition at the critical period for vegetative and reproductive development.

Malle et al. (1980), Lohani et al. (1979), Chaudhary (1982), Lohani (1974) and Bharati (1977, 1978) reported the extra yield obtained by intercropping soybean with maize. They also reported the difficulties encountered due to the poor compatibility of soybean genotypes intercropped with maize. This is probably due to the intercropping soybean genotype selected for the monoculture condition. Proper genotypic combinations and planting arrangements are specific to genotypes of the crops grown together. Chaudhary (1982), in his report indicates a highly significant yield difference among soybean genotypes and locations intercropped with maize. However, the general trend of yield response was similar. Measured by CES the highest yield recorded was 14.6q/ha. and the lowest yield recorded was 0.29a/ha. measured by CES. Soybean genotypes recommended by Sharma (1982), on the basis of the study of growth habit for intercropping are also reported by Choudhary (1982) to be more compatible under intercropping. Bharati et al. (1979) reported no significant loss of maize yield by soybean intercropping at all locations tested, except at Rampur. Soybean relayed with maize after three weeks of maize planting did not reduce maize yield at Rampur. But Pathic et al. (1979) and Russel et al. (1979) reported yield reduction of maize by intercropping with soybean when compared with maize monocrop. However, the yield reduction of maize was compensated by intercropped legumes. The highest yield compensation was noted in a corn+bean combination, followed by corn+soybean, corn+peanuts, and the lowest yield was noted from a corn+black gram intercrop combination (Pathic et al. 1979). Jaswal et al. (1979), from a cropping pattern study,

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1. Together, their adjustment is determined by the growth habits of each plant.

reported maximum total yield and gross monetary return by summer maize+soybean+winter maize+wheat relay cropping than by any other pattern studied. Relay cropping of soybean with summer and winter maize increased maize yield by 29% and 21%, respectively, whereas relay cropping of peanut decreased the yield of summer and winter maize. They further reported a 16% increase in wheat yield by intercropping soybean with summer maize and an 11% decrease of wheat yield by intercropping peanut with summer maize. Both intercrop combinations were observed after maize had been planted three weeks. Higher values for land equivalent ratios and profit from maize and soybean intercrop clearly reveals the advantage of intercropping over monocropping of either crops, especially for small farmers.

This experiment is designed with the following objectives:

- To study the effect of date of planting on yield of different soybean genotypes under monoculture.
- To study the effect of soybean intercropping at diffferent stages of maize crop development on maize yield.
- To study the effect of stage of maize crop development on soybean yield.
- To study the compatibility of soybean genotypes with maize (Rampur composite).
- To help select more suitable genotypes of soybean for intercropping or relay cropping, especially at the later stage of maize crop development so that soybean can utilize the gap period after maize harvest and before mustard or wheat planting as a filler.

Justification of Need for This Project

Since maize is grown as a main upland crop during the rainy season, soybean cannot be expected to be grown as a monocrop because the farmers are reluctant to substitute

their stable food crop, maize. Soybean could be intercropped without much reduction in maize yield if compatible genotypes were selected. Results of this experiment will be used to make conclusions, (i) on the effect of date of planting and stage of maize crop development on soybean yield, and (ii) on the difference on genotypic compatibility to be fitted for intercropping with maize.

Hypothesis to be Tested

a) Reduced vegetative growth is associated with reduced yield of soybean under delayed planting.

b) Soybean planted at a later stage of maize crop development, though late, will yield significantly more than if planted at an earlier stage of maize crop development.

c) There will be no significant difference in yield between mono- and intercropped soybean planted late after the grainfilling stage of maize.

Materials and Methods:

Treatments - There will be a two factors

a) Genotypes

1. P28
2. Celeste
3. Desoto
4. Forrest

b) Culture

1. Monoculture at date one
2. Monoculture at date two
3. Monoculture at date three
4. Intercropping at date one
5. Intercropping at date two
6. Intercropping at date three

Design: This will be 4 x 6 factorial experiment in complete Randomize Block Design with the following treatment combinations:

1.	PMD_1	7.	CMD_1	13.	DMD_1	19.	FMD_1
2.	PMD_2	8.	CMD_2	14.	DMD_2	20.	FMD_2
3.	PMD_3	9.	CMD_3	15.	DMD_3	21.	FMD_3
4.	PMD_1	10.	CFD_1	16.	DID_1	22.	FIO_1
5.	PID_2	11.	CID_2	17.	DID_2	23.	FIO_2
6.	PID_3	12.	CID_3	18.	DID_3	24.	FIO_3

Replications - 3

The Rampur composite variety of maize will be planted at normal planting time on all plots except in those where soybean will be monocultured. There will be three plots of monocultured maize and the total number of experimental units will be 75.[2] Planting intervals are one month, two months and three months after maize planting. The one-month interval may be shortened if maize planting is delayed. Four rows of soybean will be planted in between two pair rows of maize.

Plot Size/ 4m x 3M

	Maize	Soybean	Culture
Spacing: -	50 cm	50 cm	Intercrop
Inter row -	75 cm	75 cm	Monocrop
	20 cm	5 cm	Intercrop

2. Soybean will be planted at three different dates.

Intra row -	25 cm	5 cm	Monocrop

Two pair rows of maize will be spaced 2 meters apart. There will be 6 rows of soybeans in monoculture and 4 rows of intercropped plots. Only central rows of soybean from the monoculture plot and 4 rows from intercropped plots will be harvested for yield estimation.

Fertilization	Monoculture	Intercropped
Corn	60:30:30 NPK	60:30:30 NPK
Soybean	20:30:30 NPK	no additional

The whole amount of NPK in soybean monocultuure and Pk in all corn plots will be applied at the time of planting. Nitrogen in maize will be split into three doses 20 kg. each. The first dose will be applied at planting, the second dose applied when the corn is knee-high, and the third dose will be applied when it is tasselling. The first dose of nitrogen will be applied in the whole plot and the other two in split doses only in between the paired rows of maize. This will maintain the equal dose of fertilizer in monocrop and intercrop soybean culture.

MATERIALS

Material	Quantity
1. Seed bags	1000
2. Fertilizer	
3. Inoculum	
4. Harvest sacks	100
5. Sample bags (cloth)	100

6.	Insecticides	
7.	Aluminium tags	
8.	Labors	300
9.	Stationaries	
10.	Data analysis	
11.	Publication	
12.	Research Assistant	
13.	Bicycles	2
14.	Contingency	

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11. Patterson, D. T., M. M. Peet and J. A. Bunce 1977. Effect of photoperiod and size at flowering on vegetative growth and seed yield of soybean. Agronomy Journal 69:631-634.

12. Russel, T. D. and K. P. Bhattarai. Half yearly report 19779 PAC. Summer Trials pp. 34-37.

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PART D

International Soybean Variety Evaluation Experiment (ISVEX) 82.

Collaborator: R. Poudel

Introduction - This experiment will be conducted in cooperation with the International Soybean Program (INTSOY). Research materials will be provided by INTSOY. This experiment will provide opportunities to, (i) test the adaptation of soybean varieties under the Rampur environmental condition, (ii) compare local and introduced varieties, and (iii) add new germplasm which may be used directly or incorporated in our soybean breeding program.

Justification for the Need:

The easiest, quickest and cheapest method for crop improvement in a developing country where research facilities are limited is to introduce and evaluate germplasm selections. This experiment will provide us promising materials for our conditions which might be used directly after two years of testing.

Hypothesis to be Tested:

Some genotypes are more adaptable and promising under Rampur conditions and can be further tested at different locations.

Materials and Methods:

Treatments - 16 genotypes

Design - Randomized Block Design (RCBD)

Replications - Four

Plot Size - (i) Gross - 5m x 2m

(ii) Net - 5m x 1m

Spacing - (i) Inter-row - 60 cm

(ii) Intra-row - 5 cm

Fertilizer - 20:60:30: kg. N, P205 and K20/hg

Planting Date - Third week of June 1982

Size of the experiment 45.8m x 27.4m

Observations to be made -

1. Days to flower
2. Days to maturity
3. Nodulation
4. Plant height
5. Lodging
6. Shattering
7. Plants harvested
8. Pods per plant
9. Pod height
10. Grain yield
11. 100 seed weight
12. Seeds per pod
13. Percent germination
14. Quality of seed

Supplies Required

1. Fertilizers
2. Insecticide
3. Harvest sacks 64
4. Sample bags 70
5. Aluminium tags
6. Stationery
7. Labors 200
8. Soybean seed drill (hand driven)
9. Data analysis, shipment of material for protein and oil analysis and publication
10. Research assistant
11. Contingency

PART E

Survey and Germplasm Collection:

Survey of potential soybean growing area and germplasm collection will be done together.

The objective of the survey is to identify areas for optimum soybean production, and to collect germplasm to evaluate the assisting material to determine if it is promising for breeding and improvement programs.

PART F

Seed Multiplication:

Four genotypes, Bragg, Cobb, P28 and Bosier will be grown in two hectares of land for seed multiplication. Seeds of four varieties are available. The seeds will be inoculated with Rhizobium japonicum bacterial inoculum before planting. An initial dose of fertilizer at 20:60:30 MgN, P205 and K20/ha. will be given. The seeds will be planted on the second week of June, 1982.

PROJECT TITLE: Priorities for Agricultural Development for the next Ten Years in the Chitwan District of Nepal

PRINCIPAL INVESTIGATOR:

1. Pradeep Man Tulachan, Department of Rural Development Institute of Agriculture and Animal Science, T. U. Central Campus, Rampur, Nepal.
2. Dr. Pitamber Sharma, Department of Geography, Tribhuvan University, Kirtipur Central Campus, Kirtipur Kathmandu, Nepal.

COLLABORATORS:

1. Agricultural Economist; 2. Rural Sociologist/Anthropologist; 3. Agronomist; 4. Soil Scientist; experts are available at IAAS, T. U. Central Campus, Rampur. 7. Consultancy of a Professor or a researcher from the U.S.A. for one month.

OBJECTIVE:

To examine and identify appropriate traditional practices (methods), development priorities, and local resource bases to seek further improvement in the productivity of crops, livestocks, agro-based cottage industries, and agril-layer and employment to benefit small farmers and rural population of the Chitwan district.

A BRIEF RESEARCH PLAN:

Period	Nature of Work
45 days	Briefly survey and refer secondary information. Classify the whole district into different agro-climatic zones depending on topography, soil type, temperature, rainfall patterns, vegetation, etc.
45 days	Select 2 or 3 representative Panchayats from each above classified agro-climatic zones and from a general survey of farm households to group farmers with similar socio-economic and agricultural situations.
45 days	Specifically survey to examine and to investigate farmers' resource bases, problems and constraints to growth and development of agriculture, livestock and agro-based industries, and use of available resources by farmers in order to identify specific priority areas for improvement with few outside interventions.
45 days	Analyze data and write the report. The report will include specific priority recommendations and feasible intervention points for government or assisting international agencies.
Total period = 6 months (180 days)	Address issues including land, crops, livestock, grazing land, forest areas, ethnicity and socio-economic conditions of the rural population, on- and off-farm employment, the

agricultural labor situation, migrants from the hills, agro-based or agriculturally-related government and private infrastructures, and cottage industries.

APPENDIX I

SUPPLEMENT TO THE REVISED
RESEARCH PROPOSAL GUIDELINES FOR IAAS RESEARCH
AS OF JULY 1982

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SUPPLEMENT TO THE REVISED

RESEARCH PROPOSAL GUIDELINES FOR IAAS RESEARCH

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I. MUCIA RESEARCH FUNDING PROCEDURE

A. The research proposal is submitted to IAAS research committee by researcher:

1. Departments or divisions may do prior screening of proposals.

2. The research committee is composed of:

   a. One member from each department.

   b. Dean or Assistant Dean.

   c. MUCIA Chief-of-Party.

   d. Invited participants including the proposed research leader or research team, interested faculty members and outside agency representatives.

3. Each proposal should include a clear statement of:

   a. Reason for studying the problem.

   b. Researcher's knowledge of the problem including discussions with farmers, co-workers, and other professionals.

   c. Review of literature.

   d. How this research is related to continuing professional interests of researcher.

4. As stated in the 1981 Joint Annual Review, how this research relates to future planning in researcher's department in these areas:

   a. Teaching

   b. Extension

   c. Research

B. If favorably recommended by the research committee, MUCIA research fund commitment will be made by the signature of the Dean or his designate and the MUCIA Chief-of-Party or his designate.

C. If research is more than six months, provision will be made for biannual review. A shorter review period may be set by the research committee.

D. At termination of any funded phase of research an end-of-project report shall be submitted outlining research results and budget expenditures. Additional research funds to the listed research leader shall not be authorized until the previous research report is submitted.

E. Funds released to IAAS from the MUCIA research fund and not expended for the specified research shall be returned to MUCIA with the end-of-project report.

II. RESEARCH COMMITTEE POLICY QUESTIONS

A. General Emphasis

1. Nepalese agriculture and related problems.

2. Farm-related problems.

3. Multidisciplinary problems.

4. Areas not now emphasized but needing support.

B. Major Research Thrusts and Consequent Policy Question

1. The policy question is whether IAAS shall cover as wide a range of subjects as the research interests of its faculty or whether it shall concentrate the majority of research and money on three or four main topics over the next four or five years. There is support for both views and this is a critical decision for IAAS at this stage of development.

C. Specific Research Areas to be Considered

1. Production

a. Crops produced and reasons. Influence of diseases and pests on production and utilization.

b. Production emphasis for soils use and factors other than production influencing soils use.

c. Emphasis for horticulture research and reasons.

d. Animals to be be used for livestock research, and reasons for using them. The focus is on health and nutrition, and on new breeds.

APPENDIX I (Continued)

2. Farm Management

Help farmers and their families better use their resources to improve their quality of life and the quality of life in Nepal.

3. Home Economics

Presently in Nepal this area receives minimal attention, but it is critically important for the future well-being of Nepalese families.

4. Rural Development

Farmers, their families and rural neighbors live in a matrix of institutions. Institutions are created to improve life but some institutions have lost their usefulness. The question is how we can improve the institutions of education, communication, transportation, health, credit and markets which will improve quality of rural life.

R. D. research widely includes social, economic, cultural and political factors. Choosing first priority topics requires much deliberation.

APPENDIX II

IAAS/MUCIA AGRICULTURAL RESEARCH PROGRAM

APPROVED RESEARCH PROJECTS

AS OF JULY 1982

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IAAS/MUCIA AGRICULTURAL RESEARCH PROGRAM
APPROVED RESEARCH PROJECTS
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Project #1. Soybean Research and Extension in Chitwan: Principle researcher, K. P. Sharma in collaboration with S. P. Katel, S. B. Gurung, S. M. Shrestha, S. C. Shah, and R. Poudel. Several research activities will be conducted to test the hypothesis that low initial seed moisture content and seed storage conditions are more critical factors than genotypes and duration of storage in preserving soybean seed viability.

Project #2. A Case Study of the Farming Systems of Sharadnagar Panchayat: Principle researcher, P. M. Tulachan. The researcher will conduct a baseline study of farming systems in the Sharadnagar Panchayat to identify current practices and socio-economic and physical constraints faced by farmers. This material will be used to develop a farming systems handbook to be used as a reference by researchers and planners and in the agricultural economics curriculum.

Project #3. Mapping and Characterization of Major Soils of the IAAS Farm at Rampur: Principle researcher, B. R. Khakural in collaboration with H. B. Foth and J. R. Joshi. A complete mapping of soils on the IAAS farm and their classification according to physical and chemical properties will be done

to aid in the placement of experimental plots to determine the applicability of research results to other farms.

Project #4. Duck Cum Fish Culture Research: Principle researcher, K. T. Augusthy in collaboration with M. K. Shrestha. In this study, the researchers will test the economic viability of a duck/fish pond culture and examine the impacts of various food sources for ducks and fish on their growth rates.

Project #5. Year Round Production of Vegetables in Rampur: Principle researcher, Rishi R. Adhikari in collaboration with Durga D. Dhakal and Ram C. Koirala. The purpose of this project is to develop a planting schedule for year round vegetable production for home consumption and sale by farmers of Chitwan District.

Project #6. Survey and Identification of Plant Parasitic Nematodes in Chitwan: Principle researcher, M. H. Khan. The project will identify plant parasitic nematodes associated with vegetables, legumes, fruits, and other economically important crop plants, and their population and distribution in relation with hosts in different localities in Chitwan as a first step towards their control and the prevention of crop losses.

Project #7. Studies on Chemical Control of Root-Knot Nematodes of Okra and Eggplant: Principle researcher, L. N. Bhardwaj in collaboration with S. M. Shrestha and R. C. Koirala. This project will evaluate the effective dose of furadan necessary to control root-knot diseases of okra and eggplant under local conditions.

Project #8. Studies of the Effect of Seed Dressing and Foliar Sprays on Seedling Health and Blast and Brown Spot Diseases of Paddy: Principle researcher, L. N. Bhardwaj in collaboration with S. M. Shrestha, M. H. Khan, and Moti Lal. This project will test the effectiveness of fungicides in reducing losses of rice seedlings in nursery beds.

Project #9. Effect of Date of Sowing and Nitrogen Levels on the Incidence of Rice Blast and Leaf Spot at the Nursery Stage: Principle researcher, S. M. Shrestha in collaboration with L. N. Bhardwaj, R. B. Chhetry, and Moti Lal. In this study, S. M. Shrestha will test the hypothesis that the date of sowing and nitrogen levels are the critical factors affecting the suceptability of Masuli variety rice seedlings to blast and leaf spot at the nursery stage.

Project #10. Evaluation of the B.Sc. (Ag.) Program at IAAS, Rampur: Principle researchers, B. N. Pokharel and G. P. Shivakoti. The researchers will make recommendations for the improvement of the B.Sc. Program based on the results of a survey of faculty, students, and former students and their immediate supervisors.