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IAAS/MUCIA
NEPAL A.I.D. PROJECT

AGRICULTURAL RESEARCH PROGRAM

APPROVED RESEARCH PROJECTS

as of

JULY, 1982

Institute of Agriculture
and Animal Sciences

Rampur, Chitwan, Nepal

P.D. 11/2-097

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 stimulate 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.

**SURVEY AND IDENTIFICATION OF PLANT PARASITIC
NEMATODES IN CHITWAN**

Prepared By:

M.H. Khan

PROJECT TITLE: SURVEY AND IDENTIFICATION OF PLANT PARASITIC
NEMATODES IN CHITWAN, NEPAL

PROJECT LEADER: M.H. KHAN

COLLABORATORS: ONE RESEARCH ASSISTANT (TO BE HIRED)

Beginning Date: Jestha 2039

Estimated

Completion Date: Ashad, 2040

Introduction

Plant parasitic nematodes infesting the soil in the crop growing areas are one of the major obstacles to the production of crops and are becoming a serious problem for Nepal. Worldwide distribution, extensive host ranges, and involvement with fungi, bacteria, and viruses in disease complexes place these nematodes high on the list of disease-causing agents which seriously affect the world's food supply by reducing yield and the quality of crops.

In view of the paucity of information regarding the distribution, population and nemic fauna associated with economically important crops, there is a need for extensive surveys, collection, and identification of different species of plant parasitic nematodes. This will be the first and very important step towards control, prevention of crop loss due to nematodes, and more advanced research in Nematology.

Review of the Literature

Preliminary survey of plant parasitic nematodes was first carried out in 1967-1968 at different agronomy farms, agricultural stations and a few locations near Illam and Pokhara. Twenty-three generations of plant parasitic nematodes were observed in the collected samples. The most commonly occurring generations were: Helicoty lenchus, Criconemoides, Pratylenchus, Xiphinema, Heterodera, longidorus, Meloidogynoe, Anguina and Tylechbrhynchus.

This list is not complete, and continued surveys of plant parasitic nematodes in Nepal would add more to the list while providing further information about hosts and nematode pathogenicity (Amatva (1) and Shrestha, 1969).

A total of 21 species of plant parasitic nematodes were found associated with citrus. The nematodes of major economic importance were the lesion nematodes, Pratylenchus coffeae and possibly P.Brachvurus, found in 53 percent of the surveyed farms, and the citrus nematodes, Tylenchulus semipenetrans. This last was found to be common in only five farms (Panochet et al., 1978).

A survey of plant parasitic nematodes was carried out in seven districts of West Bengal from April 1972 to September 1973. Soil and root samples were collected from twenty-two crop plants. The survey revealed that eleven species of plant parasitic nematodes were associated with 22 economically important plants. Nematode species, Tylenchorhynchus-eae, Helicocylenchus-indicus and Heplilamus-indicus were more common.

Other nematodes identified were Meloidogyne species, Rotylenchus reniformis, Criconemoides, Tylenchus, Xiphinema-indicus, Heinicriconemoides, species and Pratylenchus (Mulhopadhya (5) and Hague, 1974).

Surveys of plant parasitic nematodes associated with vegetables, fruits, cereals and other crops, carried out in 30 districts of Uttar Pradesh, revealed that Tylenchorhynchus species Meloidogyne species, Hoplolaimus-indicus, Helicotylenchus species Rotylenchus-reniformis and Pratylenchus species were the most widely distributed forms. On the other hand Basiroides species, Rotylenchus species and Petamigratus species had very limited distribution. Tylenchulus-semipenetrans was confined to citrus species only. The crops surveyed were taxonomically diversified (Rashid (9) et al., 1963).

Justification of Need

Any attempt at efficient and assured production of crops requires a sound knowledge about plant parasitic nematodes infesting a variety of crop plants in Nepal. P. Amatya (1) and M. Shrestha (1969) reported the presence of plant parasitic nematodes associated with a few crop plants in a few confined localities, but no extensive survey and identification has been done in the country.

Objective

Identification of plant parasitic nematodes associated with vegetables, legumes, fruits, cereals and other economically important crop plants, their population and distribution in relation with hosts in different localities in Chitwan.

Materials and Methods

Rhizosphere soil and root samples of economically important crop plants will be collected from various localities. Soil weighing 500 gm. will be taken from a depth of 5-30 cm. in the case of vegetables, legumes, cereals and other crops, and 10-50 cm. in the case of fruit trees. Sampling will be done in a randomized fashion. Later the samples collected from the same crop in a locality will be mixed to get a composite sample, and 250 gm. of soil from this will be processed through a sieving technique to isolate the nematodes. Counting of nematodes will be done with the help of Peter's one ml. counting slide. For specific identification, the nematodes will be killed by heat and will be fixed in FA 4:1, processed through lactophenol into dehydrated glycerin (Siddiqi, 1964) and mounted on a slide.

Identification of plant parasitic nematodes will be done at IAAS and specific identification will be done at the Nematology section, Botany Department, Aligarh Muslim University, Aligarh U.P., India.

Data Collection

The following data will be collected and compiled in a systematic and scientific way for analysis.

1. Plant parasitic nematodes associated with different vegetables, legumes, fruits, cereals and other important crop plants.
2. Frequency of nematodes in each composite sample.
3. Cropping history of field to be sampled.

Data Analysis

The data will be analyzed statistically so that all the details obtained regarding the different identified species of plant parasitic nematodes associated with different vegetables, legumes, fruits, cereals and other crops, their population and distribution in relation to hosts in different localities will be presented in tabular form in the research paper.

Publication

The research paper will be published. This will be helpful to students and researchers.

Supplies Required

1. For survey and collection of samples, one bicycle and T.A. or MUCIA vehicle.
2. Labor charge
3. Tools and other accessories for collection and handling samples, and for isolating and counting nematodes.
4. One research assistant

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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 AS OF JULY 1982

- I. MUCIA RESEARCH FUNDING PROCEDURES
 - 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.

APPENDIX I (Continued)

- 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 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.

Research and development widely includes social, economic, cultural and political factors. Choosing first priority topics requires much deliberation.

APPENDIX II

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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 Around 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 susceptibility 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.