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BANGLADESH AGRICULTURAL RESEARCH PROJECT PHASE-II

Pest Monitoring and Surveillance in Bangladesh

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BANGLADESH AGRICULTURAL RESEARCH COUNCIL
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PEST MONITORING AND SURVEILLANCE IN BANGLADESH

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Contents

		Page
	Acknowledgements	i
	Preface	ii
	Terms of Reference	iii
	Executive Summary	iv
	Recommendations	vi
I	Introduction	1
II	Early Programs in Pest Monitoring and Surveillance	2
III	Status of Pest Monitoring and Surveillance	3
IV	Needs and Recommendations	5
V	References	7
	Appendix A - Individuals Contacted	10
	Appendix B - Concepts in Technology Transfer and their Application to Pest Monitoring and Surveillance	13
	Appendix C - Example Survey Forms	15

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Appreciation is also expressed to Dr. Anwarul Azim, Deputy Director, Department of Agricultural Extension, Plant Protection Wing for his assistance in interpreting the organizational systems, geography, farming systems, customs and language. Many other people contributed significantly to these understandings also and their names are shown in Appendix A.

PREFACE

This consultancy was charged with the responsibility of evaluating pest monitoring and surveillance in Bangladesh and to make recommendations for program enhancement. Our six week term permitted our making numerous observations and conducting an extensive number of interviews in regard to existing programs and future needs. No doubt, time constraints prevented us from making some observations and conducting some interviews that could have added to our evaluation and recommendations.

Recommendations made are based on our perception of requirements necessary to make a pest monitoring and surveillance system work effectively in Bangladesh. By necessity these recommendations are broad in scope because of the diverse requirements placed on the research, teaching and extension systems. Efforts of all of these systems must be synchronized for a plan to function that will make a significant contribution to agricultural production in Bangladesh.

Our confidence level is highest in our appraisal of the existing situation and evaluation of needs. We are less confident in making suggestions for implementation that must operate in existing cultural, educational and research systems. Technique adoption and adaptation can best be handled by leaders in Bangladesh.

TERMS OF REFERENCE

for

Dr. Charles L. Cole

and

Dr. C. Wendell Horne

A. Review and analyze the pest monitoring and surveillance program in Bangladesh at national and institute levels including on-site observation of field activities and organization.

B. Review and evaluate research in pest monitoring and surveillance as well as assess the role of same in the various cropping system and in farming system research projects in Bangladesh.

C. Prepare a report on the following items related to pest monitoring and surveillance in Bangladesh:

1. Status and implementation.

2. Areas needing additional research.

3. Availability of trained manpower in research and extension.

EXECUTIVE SUMMARY

INTRODUCTION

This consultancy was charged with the responsibility of reviewing and analyzing pest monitoring and surveillance programs in Bangladesh at extension and research levels. This included on-site observation of organizations and field activities. Research was to be evaluated in respect to needs of the various cropping systems. A report was also to be prepared on the findings of this study.

A large number of people were interviewed in the various institutions and organizations that deal with the different aspects of pest monitoring and surveillance. National administrative figures were interviewed at Bangladesh Agricultural Research Council (BARC) in order to get an understanding of present and future program direction. Institutes visited included Bangladesh Agricultural Research Institute (BARI), Sugarcane Research and Training Institute (SRTI), Bangladesh Rice Research Institute (BRRI), Bangladesh Jute Research Institute (BJRI), Central Extension Resource Development Institute (CERDI), and Agricultural Extension Training Institutes (AETI). University facilities visited were Bangladesh Agricultural University (BAU), Institute for Post Graduate Studies in Agriculture (IPSA), and Dhaka University. The Directorate of Agricultural Extension (DAE) facilities were visited at regional, district, and upazilla levels and four on-farm visits were made.

STATUS OF MONITORING AND SURVEILLANCE

Parts of a pest monitoring and surveillance program now exist in Bangladesh but no cohesive mechanism for coordination is present. Almost all research efforts have been directed towards qualitative surveys of existing insects, diseases and vertebrates. We commend the researchers for their efforts in this respect because it is realized that this is a necessary first step in developing a pest monitoring and surveillance system. While some work has been done on the more quantitative aspects of pest monitoring and surveillance, much of what is being used has come from outside sources such as IRRI. Adoption of this information should continue in Bangladesh.

Some research has been initiated in areas necessary to support a pest monitoring and surveillance program. These areas include development of economic thresholds, action levels, pesticide screening, race determinations and population dynamics. Most of this work is rudimentary but very promising. Work is also beginning in biological control of insect pest species through the use of predators and parasites.

Researchers are handicapped because of the inaccessability of international research journals. Without an adequate knowledge of what has been done they are destined to miss much scientific development going on in other parts of the world and furthermore, to repeat much of the work already done.

Teaching is an important component of a pest monitoring and surveillance system because those charged with its implementation must possess the knowledge, skill and understanding to make it work. Facilities for teaching ranged from very adequate to outstanding. Teaching materials, supplies and equipment were meager to adequate.

We gained the distinct impression that graduates of universities have received considerably more training in the general production areas than in the specialized areas of entomology, plant pathology, weed science and vertebrate pests. Our sampling suggested that graduates in general were ill-equipped in matters related to IPM and the more specialized aspects of pest monitoring and surveillance. While they may have been exposed to theory they are lacking in the understanding and skill necessary to interpret and apply research results.

Extension (DAE) has an extensively-structured program, employing some 23,000 people to administer, train and teach farmers improved production techniques. Through CERDI, limited materials in plant protection are being developed to support field-based personnel. A form for recording insect pest occurrence is available along with certain teaching publications. This essentially constitutes available materials to support pest monitoring and surveillance efforts. Our observation made through on-site visits and interviews indicates a need for basic improvement in getting pest control information to the farmers. A large part of this involves training of subject matter specialists and block supervisors.

Training offered by CERDI and AETI is general in nature and lacks specialization. Students are not coming away from that training with the specialized skills necessary to possess competence and confidence in pest monitoring and surveillance techniques. A review of this curriculum suggests that they are getting overview treatments of entomology and plant pathology but not specifics. Evidence indicates that instructors lack the confidence necessary to instill competence and confidence in their students.

Our perception of the status of research, teaching, extension and training in pest monitoring and surveillance is that a basic framework is present but that there is a great need to improve upon the component parts.

Teaching requirements in pest monitoring and surveillance include the development of a more specialized curriculum to cover pest identification, biology and control. Future students should possess a higher level of competence and confidence than those previously graduated.

Extension has a well structured network but should concentrate on improving the knowledge and skills of its employees in pest monitoring and surveillance. Our major recommendation is to upgrade the level of knowledge of pests among its training staff. This should supplement the general training received by most extension employees.

We found dedicated people in all facets of the system and believe that a pest monitoring and surveillance system can work with certain adjustments. Making adjustments to present programs could do much to prevent the possibly catastrophic consequences of pest attack to crops in Bangladesh.

RECOMMENDATIONS

Many opportunities exist for research to be done to support pest monitoring and surveillance. A good number of these opportunities must be researched before a strong scientific base is established.

There are two areas where research activities need to be increased. First is the area of applied research relating to areas such as economic thresholds, action levels, pesticide screening, survey techniques, crop loss assessment, disease etiology, and epidemiology. Secondly, efforts should be increased in the area of adaptive research. Here research results are taken to the field, adapted, and demonstrated.

The systems approach to implementing monitoring and surveillance programs may be approached in a number of ways. Specific systems should be researched and studied under the agricultural and socio-economic conditions of Bangladesh, and these include:

1. A government-financed and operated program such as has been implemented in Japan.

2. A program completely operated by private enterprise and financed by the farmers.

3. A program supported by research and implemented by DAE and which would be farmer-financed but subsidized through the technical assistance of research and extension efforts.

It is recommended that a central repository for international journals be established at a location convenient to scientists and educators at all institutes and universities. These journals would be of valuable assistance to those involved in any way with pest monitoring and surveillance. Some type of reference system showing document availability should be provided to all scientists and educators who could profit by their use.

It is suggested that career and financial incentives be reviewed. It appears that the only form of current advancement lies in getting a promotion to another position and mission. This destroys the integrity of programs especially when quality scientists cannot be found to fill vacant positions. There is also little encouragement for individuals to perform at a higher level when there is no financial incentive for doing so.

Research data provides the scientific base for a pest monitoring and surveillance system and without it no system can function. On the other hand all facets of the system must function properly before Integrated Pest Management (IPM) and its component part, pest monitoring and surveillance can work. Extension and Teaching become significant at this point and we in this consultancy so considered them in fulfillment of our "terms of reference".

I. INTRODUCTION

Integrated pest management (IPM) has been defined by numerous authorities. These definitions differ a little on some points. Basically they are all the same. Using the definitions found in the literature we may consider IPM as a philosophy which advocates the utilization of all available methods to manipulate pest populations to maintain or achieve non-injurious levels. This may include any compatible combination of methods including natural, biological, mechanical, cultural, chemical, or regulatory control.

The current worldwide emphasis on IPM has been brought about mainly as a result of two factors: World population crisis and an awareness of the necessity to maintain the quality of the environment. Another factor contributing to the IPM emphasis is the resistance of pests to available chemical controls and the economic impact this has had on agricultural producers.

IPM is not a new concept; it has been practiced for centuries. The present use of the concept differs from that of the past in that it is now a deliberate and conscious attempt to blend different techniques into an improved, functioning system.

A functional IPM program has three distinct components. First, the development of technology through research. Second, the transfer of the technology developed through extension and third, the utilization of this technology to control pests of plants.

Technology is the key. In looking at its development we not only look at its validity but at its applicability. In looking at the transfer of technology we must look at the system through which the technology moves and also its capacity for maintaining technical quality. The utilization of technology is the reward. It is the benefit derived from a directed, coordinated effort.

An important fact we must realize about the utilization of technology is that it must continuously be nourished with new research and fed through the transfer system.

The best pest control on your farm is your own shadow. This simply means that you must know the pest situation in a field before action is taken if the optimum results are to be achieved. A viable IPM program is made up of many components. A survey and monitoring system is an important component. It is the eyes and ears through which conditions are verified. A survey and monitoring program is the basis upon which technology is utilized.

Several objectives of a pest survey and monitoring system should be noted.

1. Determine the presence or absence of specific pests or pest complexes, their abundance and their distribution.

2. Determine the amount of damage caused individually and collectively by pests.

3. Detect and evaluate changes in pest occurrence patterns.

With these facts in mind we have reviewed and now attempt to evaluate the pest survey and monitoring systems being used in Bangladesh.

II. EARLY PROGRAMS IN PEST MONITORING AND SURVEILLANCE

The earliest record of an IPM program in Bangladesh was entitled "Strengthening Plant Protection" and was a UNDP/FAO sponsored project which was approved on 28th February, 1975. Activities of this program included training of Plant Pest Inspectors (PPI) and other district personnel. Pest monitoring and surveillance techniques were incorporated in the program. Large areas were sprayed by aircraft along with a considerable amount of ground spraying. Insecticides were furnished at no cost to the farmer. The project was concluded, in 1978.

On may 29, 1978 the "German Bangladesh Plant Protection Program" was initiated. This effort concentrated on rodents but did spade work for monitoring and surveillance. The final report was prepared and submitted on May 15, 1984 with notes indicating that objectives were not fulfilled due to the lack of technical assistance originally planned into the system.

In 1978 the Bangladesh Agricultural Research Council organized a workshop session which concluded that available information on the different plant pest problems was insufficient and there were no reliable statistics on crop losses caused by pests. Participants in the workshop noted the importance of pest monitoring and surveillance and considered the system in existence to be non-functional.

In 1979 a series of meetings were held by BARC to establish a coordinated effort to develop a pest monitoring and surveillance research unit. Its objectives were to strengthen existing plant protection services in Bangladesh by establishing and developing a pest monitoring and surveillance system.

In 1980 BARC developed a project document involving the various institutes and the Directorate of Agricultural Extension. Eight specific objectives were drafted which included statements on sampling techniques, economic thresholds and agronomic practices.

Also in 1980 a program was started which was entitled "Intercountry Program for the Development and Application of Integrated Pest Control in Rice Growing in South and Southeast Asia". It was planned to start on October 1, 1981 and to continue until September, 1985. DAE participated in the program by conducting training and developing wall posters. Funds were not made available to support additional work.

In 1983 a report was developed by BARC and entitled "A Coordinated Project on Pest Surveillance and Monitoring Research" for the 1982-83 season. Data reported was for rice and it was noted that a shortage of scientific personnel hampered program development and execution.

A 1983 initiative was developed with an FAO grant to DAE. The program was entitled "Strengthening Plant Protection Services". At this writing efforts

have been directed toward training district level extension personnel in plant protection.

Much sincere planning has been done to establish a functional pest monitoring and surveillance program. However, results have fallen short of objectives stated in the proposals. These efforts have had value but they have not culminated in a functional pest monitoring and surveillance program.

Past research programs have not provided adequate data to implement and sustain a functional pest monitoring and surveillance program capable of generating and testing necessary concepts for pest monitoring and surveillance. Furthermore the delivery system suffers from many of the same problems that plague the research system.

III. STATUS OF PEST MONITORING AND SURVEILLANCE

Scientists in Bangladesh have developed a substantial body of information on qualitative surveys. Adequate cataloging of pests is available for most major crops including rice, jute, sugarcane, pulses and many of the fruits and vegetables.

Some of the research activities now underway, by entomologists, which can be used in implementing pest monitoring and surveillance systems includes efforts in plant breeding. Jute plants have been found which show resistance to Apion carchari and to certain mite species. Cultural control methods are being tested for a number of pests. Examples include the flooding of fields to control mole crickets, the draining of fields to control brown leaf hoppers and the removal of infested canes to control stem borers in sugarcane. Also work in biological control of sugarcane topshoot borers is underway.

A great deal more research is being conducted on rice pests than on the pests of other crops. Economic thresholds are recorded for the rice stem borer, gall midge, rice hispa,brown plant hopper, green leaf hopper, leaf roller, case worm, rice bug, and ear-cutting caterpillar. Same very good work is being conducted on the control of vertebrate pests. Much of this work may be adopted and used in a monitoring and surveillance program. Examples of this work include: crop loss estimates due to jackals and their control, yield losses of rice due to rats, population estimates and control of rats, and the use of different bird repellants.

The status of research in plant pathology relating to pest monitoring and surveillance was evaluated by conducting numerous interviews and reviewing a total of 179 published papers. A breakdown of findings from the papers follows:

Subject Area	% of Papers
Disease Description	6
Pathogen Cataloging	11
Monitoring and Surveillance	0
Disease Control (Methods other than varietal resistance)	22

Subject Area	% of Papers
Disease Control (Evaluation of varietal response to pathogens)	50
Disease Etiology	2
Epidemiology	1
Evaluation of Disease Loss	6
Estimation of Disease Loss	2
	100

The array of publications reported research on 83 different crops. It can be easily seen that the major research effort has been in the areas of pathogen cataloging and evaluation of disease control methods. No papers were found which evaluated methods for pest monitoring and surveillance. However, several of the above mentioned subject areas contribute to support of such programs.

Evidence indicates that certain avenues of research in plant pathology are being followed year after year. Such redundancy is costly to the system and prevents work from being done in other critical areas. We should hasten to add that descriptive work done in the past was essential to establish a research base. Our present evaluation is that new overall objectives need to be established especially in the area of pest monitoring and surveillance.

The On-Farm Research Division, BARI, establishes research plots under field conditions. This program has a substantial professional staff. At the present time no efforts are being made in the area of research which would provide data to be used in a pest monitoring and surveillance program. Also, no efforts are being made in the area of researching systems which might utilize such data.

Recently a great deal of emphasis has been placed on cropping systems research. This is a philosophy which encompasses all disciplines and which can impact upon a number of practices related to monitoring and surveillance as used in an IPM program.

The Directorate of Agricultural Extension (DAE) has a well conceived program for technology transfer to farmers called the Training and Visitation System. Insect pest monitoring and surveillance on rice is included in that program and now involves the use of a form to report the occurrence of insect pests.

Each insect monitoring and surveillance unit is 1,000 acres. Surveying is done on a selected 10 acre block. The data from this block used to make decisions over the 1,000 acre unit. Within each unit the age and variety of rice varies considerably, thus it is impossible to make accurate pest control decisions even if an insect population was very uniform throughout the unit. This responsibility is vested in the subject matter specialist in plant protection (SMS-PP) headquartered in each district office.

Plant pest inspectors (PPI) represent another level of expertise at the upazilla level that helps to strengthen pest monitoring and surveillance efforts. They are better equipped due to training and assignment to deal with this matter than block supervisors. Block supervisors work at the Upazilla level and have

more significant contact with farmers than any other group. Unfortunately they have less formal education than any group.

Preparatory training for extension employees has been general in nature (agronomy and horticulture) and they have had less exposure to the specialized subject matter fields of entomology, plant pathology, weed science and vertebrate ecology. This causes them to be deficient to various degrees in the identification and management of pest problems.

DAE administrators are well aware of deficiencies in their staff and conduct extensive training courses through their Central Extension Resource Development Institute (CERDI) and their various Agricultural Educational Training Institutes (AETI). While these efforts are commendable, the process suffers from a shortage of instructors who possess training and skills in the specialized areas of entomology, plant pathology, weed science and vertebrate ecology. In many areas resources such as textbooks, microscopes and visual aids are also lacking.

Teaching is an important component of a pest monitoring and surveillance system because those charged with its implementation must possess the knowledge, skill and understanding to make it work. Facilities for teaching were rated from very adequate to outstanding. Teaching materials, supplies and equipment were meager to adequate.

We gained the distinct impression that graduates of these institutions have received considerably more training in the general production areas than in the specialized areas of entomology, plant pathology, weed science and vertebrate pests. Our sampling suggested that graduates in general were ill equipped in matters related to IPM and the more specialized aspects of pest monitoring and surveillance. While they may have been exposed to theory they are lacking in understanding and skill necessary to interpret and apply research results.

IV. NEEDS AND RECOMMENDATIONS

There is a need for a coordinated, directed effort in research related to monitoring and surveillance programs and for systems by which research results are implemented. A coordinated effort would avoid duplication of efforts and a directed effort would insure results which would have the greatest impact.

There are two directions where research activities need to be increased. The first is in the area of applied research related to specific components of monitoring and surveillance. Secondly, efforts should be increased in the area of adaptive research. There, research results are taken to the field, adapted, and demonstrated.

Entomologists should pursue specific research projects, always keeping in mind the applicability of their results. Economic thresholds and action levels should be established for major crop pests. Where existing data is available it should be modified so that it will be applicable in Bangladesh.

There is a great need to provide quantitative data on insect populations. It is recommended that research be initiated in the following areas:

1. Establishment of the economic status of specific insects.

2. Studies on population distribution of major insect pest species on the host, within a given field, and throughout a geographical area.

3. Studies on the damage potential of major insect pests in relation to crop phenology.

Although many basic survey techniques have been developed, an effort should be made to review and adapt these techniques for Bangladesh. New technology in this area should be researched in an effort to develop survey methods which would be applicable under the socio-economic conditions existing here.

At the present time there is a need for much basic information necessary to implement and continually improve monitoring and surveillance programs. Some of these needs include research on natural and augmented biological control, mechanical control measures such as hand picking and plant removal, and cultural control practices such as water management and destruction of crop residue.

The systems approach to implementing monitoring and surveillance programs may be looked at in a number of ways. Specific systems should be researched and studied under the agricultural and socio-economic conditions of Bangladesh. These include:

1. A government-financed and-operated program such as was implemented in Japan. A supervisory and field staff would have to be procured and maintained. Training necessary for implementation could be conducted by or contracted by government agencies. Necessary transportation, salaries and clerical assistance would also have to be furnished.

2. A program operated completely by private enterprise and financed by the participating farmers. In this case persons contracting with farmers would have to be qualified and competent individuals. They would be responsible for keeping up-to-date on all aspects of monitoring and surveillance.

3. A program supported by research and implemented by DAE. Such a system could be farmer financed but subsidized through the technical assistance of research and extension efforts. Financing could vary with this type of program from where the farmer supported all of the program, a part of the program, or none of the program.

In order to strengthen programs in plant pathology that relate to pest monitoring and surveillance it is recommended that emphasis be shifted from description and cataloging pursuits to improving methodology in disease detection, development and control. Specifically we recommend that research be increased in the areas of methodology development in monitoring and surveillance, disease etiology, epidemiology and crop loss assessment. A good initiative now exists in research related to disease control. However, these efforts need to be

assigned priorities in order to permit the accomplishment of specific goals. A coordinated research program will avoid fragmentation and permit individual efforts to contribute to objectives based in the disease control needs of agriculture on Bangladesh.

It is recommended that a central repository for international journals be established at a location convenient to scientists and educators at all institutes and universities. This is necessitated by a shortage of capital that makes it impossible to have copies at all institutes and universities. Journals should be selected that are essential to the various developmental aspects of pest monitoring and surveillance. Failure to meet this need will prevent scientists from knowing those advancements being made in other parts of the world and cause them to repeat much work that has already been done.

We suggest that a career ladder system be developed that will permit horizontal advancement. Such an incentive program will make it possible for a research scientist to meet his personal need for advancement without having to seek promotion outside his area of interest and training. This will avoid the disruption that occurs when a scientist has developed a sound achievement base and is promoted into a position having other requirements. By doing this a senior scientist system will be established that gives continuity to research programs, personal advancement when deserved and a model to encourage young scientists. Continuity is essential to development of a pest monitoring and surveillance program.

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Appendix A - Individuals Contacted

Abedin, Joynul	DAE Subject Matter Specialist in Plant Protection at Tangail District Office.
Abedin, M. Zainul	Head, On-Farm Research Division, BARI, Joydebpur.
Abedin, S. Joynul	Entomologist, DAE Plant Protection Wing, Dhaka.
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Amin, Dewan Abdul	Plant Protection Inspector in Dhamrai Upazilla.
Ashraduzzaman, Hasan	Professor and Head, Department of Plant Pathology, BAU, Mymensingh.
Aziz, Md. Abdul	Scientific Officer in Agronomy, BARI RARS - Ishurdi.
Baset, M.A.	Cane Development Officer, North Bengal Sugar Mill, Ghopalpur.
Dewan, M.N.A.	Senior Instructor (Plant Protection), CERDI, Joydebpur.
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Appendix B

CONCEPTS IN TECHNOLOGY TRANSFER AND THEIR APPLICATION TO PEST MONITORING AND SUFVEILLANCE

Pest monitoring and surveillance is a new mission in crop production in Bangladesh. Because of its newness it will by necessity have to proceed through the adoption process. In most countries this process takes from five to seven years provided the system is functional from the point of knowledge discovery to the point of adoption.

It is generally agreed that the steps in the adoption process are (1) AWARENESS (2) INTEREST (3) EVALUATION (4) TRIAL and (5) ADOPTION. While the stepwise procedure is most often applied to farmers it must be kept in mind that individuals in the delivery and research systems will also have to experience the process.

In order to speed the process of acceptance among individuals in the information delivery system it is suggested that types of training be selected that will give them a high level of individual confidence. Training given by classroom lecture should be generously supplemented by "hands-on training" conducted by a competent instructor. This can best be accomplished by using the field as a classroom.

Research shoulders heavy responsibility in technology transfers. First the research product must meet tangible needs. Secondly it must be sufficiently developed to accomplish established goals. Various criteria have been established to indicate whether or not a given innovation can succeed. The following tests have demonstrated value in determining whether a product will succeed in the "marketplace".

1. RELATIVE ADVANTAGE - The degree to which an innovation is superior to the ideas it supersedes.

2. COMPATIBILITY - The degree to which on innovation is consistent with existing values, practices and past experiences of the adopter.

3. COMPLEXITY - The degree to which an innovation is relatively difficult to understand.

4. TRIALABILITY - The degree to which an innovation may be experimented with on a limited scale.

5. OBSERVABILITY - The degree to which the results of adoption are visible to others.

It is recommended that researchers responsible for developing pest monitoring and surveillance strategies apply this system to their recommended procedures. We as consultants have done this for the overall concept of pest monitoring and surveillance and present the following observations:

1. RELATIVE ADVANTAGE - No system of pest monitoring and surveillance is in place on the vast majority of farms in Bangladesh. A scientifically-conceived monitoring and surveillance program will offer great advantages to crop production in Bangladesh.

2. COMPATIBILITY - In our limited survey we found farmers hungry for information about factors that limit their production. Unlike agricultural production in developed countries a subsistence farmer's success or lack of it dictates whether or not there will be food on the table. We believe that a pest monitoring and surveillance program will be entirely compatible with the objectives of individual farmers.

3. COMPLEXITY - This is the most important consideration of all when considering the potential success of pest monitoring and surveillance in Bangladesh. Researchers must devise systems that are simple to use but that are accurate. Failure to do this would almost certainly place a serious limitation on potential success.

4. TRIALABILITY - Many examples exist to show differences in outcomes. If chemical control is appropriate for a given pest situation, one can initiate control at different pest levels and show differences.

   We see no difficulty in meeting this criterion.

5. OBSERVABILITY - Pest monitoring and surveillance is highly observable. Given the curiosity and interest exhibited by Bangladeshi farmers no problem should occur in meeting this criterion.

We as consultants believe that two major concept-related objectives must be met to make pest monitoring and surveillance successful in Bangladesh. These deal with training of technology transfer personnel and effective simplification of monitoring and surveillance techniques.

Appendix C (Example Survey Forms)

INSECT SURVEY FORM

_____ (Name of crop)

_____ (Name of pest)

Date _____

Location _____

Field ID No. _____

Name of Surveyor _____

OVSERVATION-1	NO. OF PESTS/100 PLANT			DAMAGED PLANTS - 1	
	Adult	Larvae	Eggs	No.	Rating (1-5)
Rep I					
Rep II					
Rep III					
Rep IV					
Total					
Average					

Comments: (Weather, insecticide treatment, irrigation etc.)

_____

_____

_____

_____

INSECT SURVEY FORM

_____
(Crop Name)

Date _____ Location _____

Field ID No. _____ Name of Surveyor _____

PEST NAME	NO/SAMPLE					Average
	Rep I	Rep II	Rep III	Rep IV	Total	

Comment: (Weather, Insecticide Treatment, Irrigation Etc.)

_____

_____

_____

_____

A Suggested Simplified System for Recording Incidence and Severity of Plant Diseases in Bangladesh

Disease Incidence and Severity

I	II	III	
1	1	1	Healthy (No disease)
2	2	2	Slight
3	3	3	Moderate
4	4	4	Severe
5	5	5	Dead or Totally Devitalized

I II III

Diseases Rated
(Circle one number for each disease rated. Make at least three observations in a single field before making a rating)

State of Crop Development

1. Seedling emergence
2. Preflowering/Early Vegetative
3. Flowering or Mid-Vegetative
4. Seed Set or Late Vegetative
5. Harvest
   (Circle one number)

Farmer's Name and Field Number

Rationale for this simplified system

1. Can be used by individual with minimal training.
2. Serves to record basic data related to disease occurrence and severity.
3. Seen as a beginning with simplified procedures leading to future sophistication.
4. Can be used on any crop with any disease.

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