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Survey Research in Support of Cropping System Improvement

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Introduction

There is general agreement that researchers need to collect data about the climatic, agronomic, social and economic features of a location before moving into a new site and initiating trials designed to improve the existing cropping system. In addition, it is often proposed that the first survey should provide benchmark data against which we can compare the introduced patterns, evaluate constraints to intensifying the cropping system and a variety of other objectives. Implicitly, the multi-purpose first survey assumes that the broader the scope of the data collection effort, the greater the likelihood that the introduced patterns will prove to be appropriate for the ecological and factor endowment characterizing the location. Further, its assumed that economies in data collection may be achieved by conducting an intensive survey. As a result, a long list of "necessary" data is drawn up and a protracted "first" survey is launched. The data collection operation may take several months ana analysis even longer.

This strategy has at least three weaknesses. First, because a large body of data is collected, the report will not be available when the cropping systems team has to decide what technology should be tested at the site. Consequently, the trials are designed without the benefit of the information collected in the first survey. Second, much of the data collected will prove to be too general. Since the researcher knows little about the site before designing the questionnaire, he can not frame specific andprecise questions that would permit him to collect the data that is necessary for understanding the constraints to cropping systems improvement. Finally, survey data is relatively poor for establishing a socio-economic baseline since information on two of the most important parameters labor and income can not be effectively collected through a recall survey. These problems have been recognized by other researcher.[1]

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[1] S.B. Mathema and M.G. van Der Veen; and G. Banta.

Hence if two or three researchers are sent to a village, one each can be assigned to collect the secondary, experimental, and survey data. When returning to the office these data sets can be integrated into a comprehensive report that is available within one or two weeks.

Biological and socio-economic feasibility

The introduced technology must be evaluated as soon as data is available to guide future research plans.

Problem Focused Survey. After the cropping pattern experiments have been established in the field for at least one season, sufficient knowledge of the site will have been acquired to identify probable agro-climatic, and socio-economic constraints to be further investigated through a problem focused survey. Generally, these constraints will be related to various aspects of the new technology introduced. For example, in the Jatiluhur cropping system site in Wet Java, farmers' in the lowland villages grow two crops of transplanted rice. Here, the new technology includes direct seeding the first rice crop (gogo rancah) planting a second and third transplanted rice crop without plowing (walik jerami), short duration varieties, and higher input levels. In the rainfed villages, the farmers normally grow one transplanted rice crop followed by a secondary crop. Here, the new technology includes dry seeding the first rice crop, planting a second and third secondary crop, a short duration rice variety, improved secondary crop varieties, and higher input use.

In each of these environments, several potential constraints have been identified by consulting with the agronomists involved with the field work and visiting the site to talk with farmers and local officials. These hypothesized constraints include the availability of labor for early land preparation and rapid turnaround between crops, availability and variability of rainfall for dry seeding, rat damage to early (non-synchronized) planted rice, farmers' preference for local varieties, availability of labor for weeding the dry seeded rice crop, crop specific pest problems, land tenure situation (large amount of non-resident land ownership), and unawareness of new technologies such as direct seeding and walik jerami. Having identified these "problems," a set of hypotheses were developed to evaluate the importance of each problem and determine the probable cause. Using these hypotheses as a guide, a questionnaire was designed and a set of dummy tables drawn up.

In order to make the economics component of the cropping systems research program more relevant, it is necessary to identify (1) the cropping systems research stages, (2) type of analysis required at each stage; and (3) data required to complete the analysis, as shown in Table 1. Only by explicitly identifying the goals of each stage, will it be likely that the data collected will permit the researcher to achieve his goals.

Site description and selection

The primary purpose of the first data collection effort should be to generate basic data which can assist the researchers to select among several possible sites and identify the major parameters which may affect pattern choice. These results must be available before the cropping systems team designs the technology to be tested.

Secondary data. In Indonesia, there exists a great deal of secondary data collected at the village level (desa) which may be used for this purpose, including: monthly rainfall; soil type; land classification; land use (irrigated, rainfed, upland, home garden); population by age and sex; hectares planted and harvested each month by crop; output and yield by crop; hectares in the government's production programs (Bimas); number of tractors, carabao, cooperatives, rice mills and extension workers.

Experiments. In addition, various governmental research activities have conducted experiments at the village level. These include multi-locational variety trials, multi-locational fertilizer trials, insect pest monitoring activities, national crop cut estimates and extension demonstration plots. These data sets - when available for the locations being considered as cropping systems sites - constitute a rich source of data that can be successfully exploited.

Survey. The survey operation should be narrowly focused on farmers' resources and technology including varieties used, typical cropping pattern, major biological constraints, input availability, technology used (fertilizers, herbicides, insecticides), and marketing opportunities. In all instances this data can be collected through a "village leader" or a "group interview." In both of these operations, a relatively structured, but open-ended questionnaire is used to get an overview of the agricultural situation in the village. This type of survey will take about one day per village and the information collected can be summarized during the evening following the survey.

Before implementing the survey, the questionnaire was pre-tested to evaluate the wording, format, and reasonableness of each question. In addition the pre-testing provided an opportunity to develop precoded response categories. After making the necessary correction the survey of 120 farmers (15 agronomic and 15 economic cooperators in each of four villages) was conducted by assigning two enumerators to each village for about two weeks. The data was then transferred to sorting strips and analyzed in terms of the original hypotheses. In addition, several descriptive tables were prepared to provide picture of the overall farming situation.

The results of this analysis will provide the cropping systems research with information which will assist in guiding future research at these sites.

Experimental Data: Component Technology and Constraints. During this research stage, the economists should provide an economic interpretation to the data collected in the first years field trials. The component technology applicable to the introduced patterns can be evaluated to determine the response function (fertilizer and insecticide) and benefit-cost of discrete treatments (variety and agronomic practices). Sensitivity analysis can also be introduced to evaluate the effect of varying input and output prices on the optimum input levels and benefit-cost of the technology.

Also, it may be that marginal improvement can be made in the existing cropping pattern which will greatly increase their profitability. The comparison of farmers' cropping pattern to introduced cropping pattern would be more relevant if we also evaluated the relative importance of various biological constraints and the output increase that could be obtained by breaking each of these constraints in the existing farmers' pattern. This information may be obtained through conducting incomplete factorial experiments in farmers' fields planted to the existing cropping pattern.[2]

Monitoring. Monitoring activities involve recording inputs (including labor) used and output obtained. With this data a comparison is made of the relative profitability of the introduced versus farmers' pattern. Also, the patterns are compared in terms of various characteristics including returns to material costs, returns to labor (total, hired, family), and similar items. Yet, the existing methodology for comparing farmers' to introduced patterns need to be strengthened. A great deal of thought must be given to determining the relevant parameters and how to meaningfully interpret the differences in these parameters that may be observed between patterns.

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[2] S.K. de Datta et al.

Design and testing cropping patterns and pre-production testing

These stages are basically an extension of stage two, but with more of emphasis on large plot pattern trials. The economic evaluation follows the type included in stage II. In addition, where specific constraints are identified, problem focus surveys may be implemented.

Implementation

After the newly developed patterns have been tested, they must be introduced on a large scale. One year after implementation, a survey can be conducted to measure the impact of these patterns. An "evaluation survey" should focus on a narrow set of issues to identify farmers' problems in adopting the patterns and the benefits obtained. With this information, it will be possible to modify components of the pattern where problems are found. When no constraints are observed, the data can be used to show the benefits to be obtained through extending the introduced patterns over similar agro-climatic and socio-economic environments.

Conclusion

In order to effectively conduct and evaluate cropping systems research, each stage must be specified in terms of objectives, activities and data required. The more carefully this is done, the more efficient will be the data collection operation. In addition, careful identification of the type of analysis to be performed before data is collected will insure that after collecting our data, it will be possible to undertake the desired indepth analysis.

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Table 1. Stages in cropping systems research and associated activities

	Phase				
	I	II	III	IV	V
	1	1 & 2	2 & 3	3 & 5	
Year Activities or Stages	Site selection and description	Biological and socio-economic feasibility	Design and testing of cropping pattern	Pre-production testing	Implementation
Agronomic Activities	Collect agro-climatic secondary data	Sequential testing on small plots (variety, fertilizer, crop combinations)	Large plot pattern trials	Farm wide pattern trials	Area wide pattern trials
Economic Activities	Collect socio-economic secondary data and conduct key informant interviews	Monitor crop combination trials and farmers' existing patterns problem focused surveys	Monitor introduced pattern trials and farmers' existing patterns problem focused surveys	Monitor pattern trials and farmers' existing patterns problem focused surveys	Evaluation survey
Objectives	Complete brief profile of agro-climatic and socio-economic environment	Stages II-IV Evaluate 1) Farmers' biological constraints 2) Potential of the new technology 3) Constraints to adopting the new technology			Evaluate the impact of the new technology on income and output