Note: Draft

DEFINING AND ESTABLISHING RESEARCH PRIORITIES*

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DEFINING AND ESTABLISHING RESEARCH PRIORITIES *

INTRODUCTION

- In resource-poor countries, must establish research priorities.

- Cannot afford research on whims of researchers

- How to establish such priorities?

- Can they be established by tradition i.e. doing what has been done before?

- Should research be farmer focused?

- Overall priorities such as emphasis on small-scale or large-scale agriculture; emphasis on cash crops, food crops, or specific commodities; emphasis on export crops; emphasis on geographic areas or agro-ecological zones; etc. should be defined by government as a part of national policy.

- In this paper, we are concerned with the establishment of research priorities by researchers themselves within the overall guidelines defined by government. We shall restrict our remarks to crops research.

- The role of agronomic research is to increase production of crops in an economic manner, not to fill a book with nice information. This generally means increasing yields per unit area because the option of increased area often is not available. Increased yields can only be obtained by development and adoption of improved technology. By definition "improved" implies that the technology fits the farmers' biological, physical (natural) and socio-economic circumstances. Hence, the research to develop such technology must be interdisciplinary, and be geared to farmers' circumstances and farming systems -- that is, the research should have a farming systems perspective (FSP).

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Even when we use an FSP in setting research priorities, the experimentation is still carried out on a commodity (or enterprise) basis but possesses the following features:

- Research thrusts are derived from farmers through the diagnostic process i.e. they are problem-oriented and client-driven.

- Potentially useful technology is tested under the farmers' environment.

- The technology is evaluated using criteria which are consistent with those used by farmers.

"TRADITIONAL" RESEARCH THEMES.

- Where research has been organized along commodity or discipline lines, there has been research on:

- Development of "improved" varieties including pest & disease resistance.

- Soil fertility and fertilizers

- Water management

- Weed control

- Chemical control of pests

- Chemical control of diseases

- Tillage

- Plant population and spacing

- etc.

Certainly:

- Breeding programs are needed

- New varieties need plant population studies

- Fertilizer use needs investigation

- Also, weed control practices including herbicides

- etc.

However, since resources are limited (everywhere),and the objective of agronomic research is to provide recommendations that increase the productivity of farmers then priorities cannot be decided in isolation from farmers.

Thus, while some resources will undoubtedly be assigned to the traditional commodity or discipline research organizations and their activities along traditional commodity and discipline lines, there is a need for an awareness of farmers' problems in that decision-making process and a need for more resources to be assigned to a more integrated interdisciplinary approach to address

immediate farmer problems with the goal of deriving production recommendations for farmers.

Recommendations arise from responses to management factors. A response to a management factor implies that a problem exists at the moment and a change in technology can alleviate the problem.

OBJECTIVES IN SETTING RESEARCH PRIORITIES

- To select those research activities which have the greatest potential for increasing farmer income and productivity.

- To ensure that the limited time and research resources are used as productively as possible.

- To provide information on which to plan future experimentation (on-station and on-farm) with the aim of developing production recommendations for farmers.

In setting research priorities, it is important to:

- identify the production problem(s)

- identify the cause(s) of the problem(s) or systems interactions. Must distinguish between symptoms and causes (true diagnosis).

The research opportunity arising from the existence of a production problem is dictated by the causal factor for the problem or system interaction. The same problem may arise from a number of causes which will determine the potential solutions. Similarly a system interaction may enable us to identify an indirect research opportunity.

Example 1. from Central Province of Zambia.

Problem: Poor stand establishment in maize.

Possible causes	Research opportunities
1. Uneven dribbling of seed behind plough and uneven depth of planting.	Improved method of planting.
2. Pest attack -- seed	Seed treatment
-- seedling	Seedling treatment
3. Poor seedbed preparation	Better land preparation methods.
4. Poor seed quality	Certified seed
5. Low seeding rate	Seeding rate experiments to find optimum"

Example 2 from Ethiopia.

Problem: Land preparation and planting of noog is late.

Here there was competition for labour when noog should be planted -- for the second weeding of maize, for the weeding of pepper (a cash crop) and for land preparation for teff (5-7 ploughings). So, the problem of late land preparation and planting of noog might be alleviated by:

- Better land preparation for noog -- direct intervention
- Use of herbicide for maize indirect interventions
- Use of herbicide for pepper capitalizing on systems
- Better land preparation for teff interactions.

PRIORITIZING PROBLEMS

In any given production system, there are a large number of problems. Given the current circumstances of many research institutions, it is not possible to handle all these problems simultaneously. There are two major reasons for this:

1. Limited research resources
   - Funds and mobility (continuously declining)
   - Trained manpower
   - Time.
2. All problems are not of the same importance. In terms of
   - Farmers objectives and priorities/preferences
   - Impact on the system
   - Cost/Budgets, etc.

Therefore there is a need to rank the problems once they are identified. There are no definite rules but one could use the following criteria:

1. Problems important from the farmers' point of view.
   - Problem affecting the farmer most
   - Problem affecting most farmers i.e. the number of farmers who are affected by the problem.

   Farmers should identify themselves with the problem.

2. Potential for improvement once the constraint has been removed.

3. The researchers'ability to solve the problems based on available technology. i.e. the existence of apparently feasible solution to the problem. If the problem is important from the farmers point of view and no technical information is available then this will receive a high priority in on-station research activities (in some cases even in on-farm experimentation).

4. The frequency with which the problem occurs.

5. Cost associated with the research i.e. likely cost of conducting the research program to solve the problem.

6. Flexibility of the farming system with regards to this problem.

7. The relative ease or difficulty of removing this constraint/problem.

8. The political acceptability.

The first 5 are very critical on many occasions and the last 3 criteria may play a minor role depending on the circumstances. A matrix could be constructed using these criteria and a ranking of problems could be completed.

POTENTIAL SOLUTIONS TO PRIORITY PROBLEMS

Once the top priority problems and their causes have been identified, as many potential technological solutions as possible should be considered and evaluated (the process of screening or pre-screening) for:

- Technical feasibility
  - produce higher yields on farm
  - practicable under farmers' circumstances.
- Economic feasibility
  - profitability
  - system compatibility
  - risks.
- Social acceptability

Those potential solutions that emerge from this screening process should be incorporated into an integrated research programme incorporating OFR or OSR as appropriate.

HOW TO PUT A "FARMER FOCUS" INTO RESEARCH PROGRAMS.

This can be achieved by interviewing farmers (surveys) on their natural and socio-economic circumstances. These interviews should be preceded by a study of secondary data (on rainfall, temperatures, soils, markets, input supplies, etc. etc.). The survey should be conducted by an interdisciplinary team of biological and social scientists. In addition to interviewing farmers, management practices and production problems should be viewed first hand. This is important since many problems may not be fully understood by the farmer. (i.e. nutrient deficiencies, soil problems, diseases or pests).

- Generally commodity/disciplinary research on-station ignores socio economic aspects and concentrates on agronomic/biological performance of technology.

- As a result, recommendations based solely on station-based research are frequently not adopted.

- Thus, diagnostic work at the farm level (surveys and experimentation to confirm the survey results) is needed.

- The results of such OFR activities lays the framework for future research efforts aimed at solving identified farmer problems.

- Once farmer problems and causes are identified, a whole range of potential solutions should be considered, screened, and the most-promising followed-up in experiments.

- If properly designed, carried out and interpreted such OFR should provide solutions to farmers' immediate problems.

- If no immediate solution is evident from OFR, then the problem may need to be investigated by commodity/discipline researchers for them to work on other potential solutions.

PRODUCTION RECOMMENDATIONS

- Cannot use a "blanket" recommendation for whole country.

- Cannot have individual recommendation for each farmer.

- Must be a compromise.

- The compromise must be closer to the blanket recommendation than the individual recommendation i.e. a few recommendations for variety, fertilizer level etc. are needed for most countries, each one tailored for fairly large target groups of farmers (recommendation domains).

- To produce recommendations for target groups entails identifying the target groups and their circumstances (within a target group, the farmer circumstances are sufficiently alike that one recommendation will suffice).

CAUTION: Remember that a recommendation is a compromise for a large number of farmers whose circumstances are similar. They are not the same. Farmers within the target group will modify the recommendation for a whole host of reasons so we must be careful to specify where precision is important in recommendations (e.g. dose of herbicide) and where it is not so vital (e.g. plant population, N fertilizer rate).

ORGANIZATION OF ON-STATION RESEARCH (OSR) AND ON-FARM RESEARCH (OFR)

- Not our role to recommend institutional structures; however,

- Some advantage to having the same researchers involved in both commodity/disciplinary research and OFR/FSP.

- Any institutional structure must be made to work and probably many different structures can be made to work.

- The important thing is that the research should be interdisciplinary and have a farmer focus -- "every plot should be planted with a particular farmer problem in mind".

- Evaluation of treatments should use not only biological criteria but socio-economic criteria as well. [Evaluation of OFR information to be covered in a parallel paper].

In the 10-15 years that CIMMYT has been advocating the above methods for establishing research priorities, many have misunderstood the motivation behind them -- it is not to close experiment stations -- it is just to bring a research focus (both on-station and on-farm) on real farmer problems.

There is a great need for on-station research on traditional themes such as:

Plant breeding
Screening new pesticides
Machinery development
Dates of planting
Plant population and arrangement
Rotations
Soil and water management
etc.

All the above types of research should be made more relevant if there is feedback from farmers through on-farm researchers e.g. the Kenya case of research on fertilizer placement in a maize-bean intercrop.

The above activities need the controlled conditions of the experiment station. However, in deriving recommendations for farmers whose conditions are often much different than the station, further experimentation is needed under those conditions. In many cases, experimentation can start under farmers' conditions e.g. fertility experiments, weed control experiments etc., because the farmers' conditions are different from those on the stations e.g. fertility status, weed populations, pest problems, etc are often different, not to mention socio-economic conditions.

So, what we at CIMMYT advocate is a balance (or a blending) of research directions:

- Some based on traditional commodity/discipline decisions.

- Some based on a knowledge of the specific circumstances of target groups of farmers.

To be most effective, these approaches must be integrated, preferably through the same research personnel being involved in both types of activities. In reality, no commodity or discipline researcher can afford to be isolated from the farmers' perspective.

More and more countries are realizing that they cannot afford the luxury of research that is not oriented toward the solution of immediate farmer problems.

RESEARCH EFFICIENCY

- This is a difficult concept but must encompass the idea that the interests of individual researchers must take second place behind the needs of farmers.

- On-station research appears to be more efficient in use of resources but may not directly lead to viable recommendations.

- On-farm research appears to be costly in terms of recurrent expenditures but should greatly improve relevance of research if properly planned, implémented and evaluated.

- The important thing is to do each individual trial where it is most appropriately carried out (on-station or on-farm).