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ABSTRACT

Despite a growing literature on how to conduct agronomic and economic evaluations of on-farm trials with developing country farmers, virtually nothing has been written concerning sociocultural variables that can influence farmers' behavior. This article discusses the cultural communication gap that often exists between agricultural scientists and farmers. It outlines seven key questions for understanding small-scale farmers in developing areas.

Additional index words: Agricultural development, On-farm research, Farming systems, Cultural communication.

THE way humans perceive their environments, other people, or everyday events varies according to their relationship to them. To most people a camel is a camel. Or snow is simply snow. Not to the nomadic Bedouin Arab, however, who as camel herder can distinguish between hundreds of types or conditions of camels. Or to the Alaskan Eskimo who recognizes and deals with equal variety in states of snow. On another front, even though husband and wife are engaged in the same institution (marriage) and have mutual goals (a successful family), each views the situation differently. Humorous and not-so-humorous daily misunderstandings arise from this unavoidable "seeing-the-world-through-different-eyes" fact of life.

And so it is to a large extent with agricultural scientists and farmers in developing countries. Both are engaged, in their own way, in the same effort: increasing the efficiency of agricultural production. Scientists strive to achieve this goal because it represents the practical payoff of their research, and farmers, because it is their livelihood. To work effectively, however, agricultural scientists must honestly admit that farmers cope with different worlds and have different perceptions of reality. Scientists' productivity, often measured by reports and publications directed toward other scientists or policymakers, is not the same as farmers' productivity, measured by basic survival, maintenance of family or increased profits.

Fortunately, farmers the world over recognize the benefits of many kinds of agricultural technology produced through science. The challenge, therefore, is to bring farmers and scientists into meaningful communication so that scientists are working on real problems rather than imaginary ones.

This is one basic reason for on-farm trials and active involvement of farmers in the research process. It helps scientists understand if technology developed on an experimental station is worthwhile. Farmers, however, must be convinced that the scientist is not just another "rural development tourist" but honestly concerned with solving practical problems (Chambers, 1980). This is no easy task, especially if status, economic, linguistic, or ethnic differences stand between scientists and farmers.

The purpose of this paper, therefore, is to provide some simple perspectives for the applied scientist or practical field technician on how to understand the farmer's point of view, especially in relation to on-farm agronomic experiments. These guidelines should be relevant whether dealing with fully commercial farmers or remote, marginal peasants. This article serves as a sociocultural supplement to related publications that deal with agronomic and economic evaluations of on-farm trials in developing countries (see Cortbaoui, 1982, and Horton, 1980).

SEEING EYE-TO-EYE: FARMERS AND SCIENTISTS

Farming in most developing countries is more than simply a business. For small-scale, subsistence farmers and their families, it is a way of life that has evolved over time, often centuries. Such rural populations have experimented with nature, manipulating resources, and adjusting human culture and technology to demands of their physical environment. They have, through trial and error, learned to arrange themselves socially and psychologically in order to successfully execute the mundane tasks of day-to-day farming. The agricultural systems encountered around the world today are logical outcomes of such time-tested adaptations.

When agricultural scientists enter a rural area with new technology or programs not indigenous to the local culture, they encounter a farming way of life that works and is valued by those who practice it. The system may not be "perfect," but it serves well enough so that farmers will invariably cast a questioning eye on practices proposed by outsiders. Universally farmers are concerned with risk, which simply means the possibility or chance of suffering loss. They determine a new tech-

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nology's level of risk by experimenting on their own, over time, under their conditions, and in more fields than one. If new practices prove worthy, farmers will accept them. Farmers are not traditional or conservative in a negative sense; they are simply cautious toward unproven ideas.

In expressing rural values, farmers often go to great extremes not to offend village guests, in this case visiting agricultural scientists. This practice occurs in some societies, such as in Asia, more than in others. What farmers express to outsiders, and what farmers think, are often different. Also, farmers—especially peasant cultivators—sometimes defer to or are intimidated by educated, urban-based people.

Potential personal gain may underlie what farmers tell scientists. If a farmer gains prestige through association with a team of agronomists, or is hoping for costly inputs to be supplied, his answers may be those he thinks the team wants to hear. In most farm communities will be found the ever-present "professional farm technology tester," the individual motivated by other than sincere interest in improving farming practices.

Scientists or field technicians should also be aware of their own biases in selecting cooperating farmers and locations for trials. On-farm research under farmers' conditions is normally difficult to execute logistically. It is natural at times for agronomists to be inclined toward: 1) elite farmers who are economically above the average; 2) cooperating with men only, excluding women; 3) locating trials near the best roads to save us from walking any difficult distance; and 4) selecting villages that are more prosperous although not necessarily representative of a region (Chambers, 1980). There is no easy way around these biases, some of which may not be necessarily negative. However, if they are restricting the representativeness of trials, attempts should be made to correct them.

SEVEN KEY QUESTIONS IN THE FARMER EVALUATION

To help understand farmers, scientists can ask the following seven basic questions:

1. Is the problem to be solved important to farmers?
2. Do farmers understand the trials?
3. Do farmers have time, inputs, and labor required by the improved technology?
4. Does the proposed technology make sense within the present farming system?
5. Is the mood favorable for investing in new technologies or crops in a region?
6. Is the proposed change compatible with local preferences, beliefs, or community sanctions?
7. Do farmers believe the technology will hold up over the long term?

In asking these questions, scientists can come closer to understanding their clients by trying to "think like a farmer." If in the farmer's place, given the circumstances and resources, what would be one's view of the technology being proposed? At this point it is best to

remember a simple rule of thumb: the farmer is the teacher, "the expert" about local farming practices, and much of value can be learned from the farmer. The urge at this point to be the all-knowing adviser should be tempered.

It is important to seek answers to these questions continuously throughout the trials, talking not only with the cooperating farmer but neighbors as well. The purpose is to objectively understand how farmers perceive trials and proposed technology. If farmers do not understand new technology or believe it is appropriate, they will not be motivated to use it (Hildebrand, 1980-81).

1. Is the Problem to be Solved Important to Farmers?

It is important that scientists not project their values or preferences too much into the farmer's circumstances. For example, a potato (*Solanum tuberosum* L.) specialist may feel that Andean farmers could speed up the process of drying potatoes for producing dehydrated products through adopting a solar drying box. However, speed of drying may not be important to farmers. Likewise, experiments with seed storage in regions where seed is not traditionally stored for good reasons, but brought from other regions at planting time, would be of little interest to farmers. The same is true of storage experiments to reduce sprout elongation of seed tubers through indirect light storage when farmers wish to quickly break dormancy. In other cases, farmers may have no interest in investing in potato technology since little of their cropping system involves potatoes. If onion (*Allium cepa* L.) is the big money maker, and potatoes are only for family consumption, farmers may have little interest in changing their practices.

The trial is an excellent way to determine if a "problem" is important. However, it is crucial to remember that commercial production may not be the only objective; that taste of a variety, for example, to the home gardener may be more important than yield.

2. Do Farmers Understand the Trials?

This question is tied to a series of corollary questions. Was it clearly explained what technology was being tested and why? Was the number of experimental variables too large? Were there too many replications? Was the technology too complicated or sophisticated?

Complex experimental packages frequently are difficult to understand. Also, many technologies interesting to scientists may be alien to farmers. Promising technologies, such as potato strains with hairy leaves that trap insects, true potato seed, fungi that consume nematodes, may be so alien to farmers that they will have difficulty comprehending the technology's utility. In these cases, attention should be given to carefully explain the new practice. Technologies which build on existing, traditional practices will probably stand the best chance of being understood.

3. Do Farmers Have Time, Inputs, and Labor Required by the Improved Technology?

What are the logistical aspects of properly implementing the new technology? "Under farmer's conditions" involves more than doing a trial in a farmer's field. While inputs may be locally available, a farmer who walks or takes local buses operates under different circumstances than scientists or technicians with a private four-wheel drive vehicle. Simple tasks, such as buying and hauling a sack of fertilizer, will be far more difficult for a farmer without private transportation.

Planting times are extremely busy for everyone. Although a farmer may wish to make changes, the person may not quite get around to putting the idea into practice. It may just seem to cause too much trouble. A farmer may even see the potential benefits of a technology, but for purely logistical difficulties, he may not be able to make changes. For example, although oil in an automobile should be changed every 2000 km for maximum performance, few change it on time.

Labor and time limitations are widespread farm problems, but they are often more serious for farmers. Among the three elements of production—land, labor, and capital—the importance of land and capital is easily understood. Labor is a much more subtle factor. Its availability is not only important for getting basic jobs accomplished, but also determines whether a farmer is willing to invest in changes. For example, a farmer may not cut seed tubers or hill-up because of labor shortage. Also, farmers have to consider alternative uses of their labor. For example, in many parts of the world characterized by heavy out-migration, those left behind often neglect the land, since remittances from migrant earnings are sufficient for family needs. Conducting research trials in such contexts could be a frustrating matter. Also, farmers fully employed with their present crops may find unattractive any practice requiring increased time or labor inputs.

4. Does the Proposed Technology Make Sense Within the Present Farming System?

To function, all parts of a farming system must fit together relatively harmoniously and adapt to the surrounding environment. Various activities must be coordinated: planting dates, movement of herds, crop rotations, and labor scheduling. Think of the analogy of an automobile. Engine and component parts, electrical system, and drive mechanism all must be integrated and coordinated. A failure or alteration in one part of the system affects the entire system. Proposed technology must not clash with existing practices and technologies.

Although indigenous farming practices have evolved from local conditions, we can never say adaptation is perfect and could not benefit from change. Farming practices related to a given crop are linked; a change in one practice will affect others. Setting up the planting date to avoid hail damage, for example, may not be pos-

sible because seed is not available earlier, other crops on the land are not yet harvested, family labor is in the jungle working the coffee harvest, or village herds have not yet been moved to higher pastures and would destroy the early emerged crop.

Agricultural systems are often finely tuned, and an alteration in one part of the system reverberates throughout the system. Changing the variety of potato may mean that a host of practices may have to be altered, including cultivation methods and storage. In another vein, if farmers have traditionally used locally available organic fertilizers (barnyard manures) or combined them with chemical fertilizers, then experiments using only chemical fertilizers may make little sense in the farmer's logic and budget. If the farmer starts using only chemical fertilizers, what will become of barnyard manure? The farmer may look at a parcel of land in terms of a rotation system. For example, when fertilizer is applied to a field, the farmer may be consciously fertilizing not only the next crop but several crops that follow. And if a parcel goes to fallow next year, no fertilizer may be used at all.

Finding out if a technology is compatible with a farming system or local technology is not easy. One has to probe deeply. For example, say a field in a certain mountainous zone has been selected as the location for trials. Agronomists have decided that regularly scheduled weeding would improve production. Their results show the possibility of increasing yield through regular weeding. However, a closer examination of farmers' full range of activities may reveal why they do not weed. Farmers must make decisions about many parcels at different elevations. They have a ranking system in which some parcels, especially those exposed to frequent frost or drought and located far from a community, are considered marginal (high risk, low productivity). Other more favorable plots are given high priority (lower risk, higher productivity). In nearly all cases, farmers have limited access to labor so the marginal parcels are left unweeded, although they hope for some production.

Although farmers in ecologically heterogeneous areas allocate their resources over several zones of production, it is crucial that homogeneous types of farmers are identified so that a technology can be general enough to be relevant to the whole group rather than one farmer. This also is not an easy task and involves grouping farmers according to cropping systems, agro-economic constraints, and sociological characteristics.

5. Is the Mood Favorable for Investing in New Technologies or Crops in a Region?

Essentially, this question suggests understanding farmers' orientations toward investment or innovation in crop production brought about by broader economic conditions. If trials are conducted when prices have hit rock bottom and have stayed there for two or three seasons, promoting changes could be a losing battle.

Even if farmers believe a change may be beneficial, they may respond with general pessimism. This statement also holds true in regions where one crop is being replaced by a commercially more attractive crop.

The same can be said for individual households: some are more innovative and receptive to change than others. The reason may be, in part, because of the position in the life cycle of the farming unit. Older farmers with departed offspring tend to be less interested in change than younger farmers. Young growing families will tend to intensify land use more than families where many members have migrated. In fact, some argue that the basis of agricultural innovation and intensification throughout history has been the pressure of population on less and less land.

6. Is the Proposed Change Compatible with Local Preferences, Beliefs, or Community Sanctions?

Some scientists consider cultural phenomena such as taste or color preferences of foods, superstitions, or ceremonies to be quaint. Yet, while Westerners are quick to recognize the superstitious nature of Third World farmers, they are slow to see it in themselves. Modern, urban man's superstitions, however, are not so different. Why is there rarely a Gate 13 in airports, a Seat 13 on airplanes, or Floor 13 in hotels? Generally, in farming, superstitions do not interfere with rationality; in fact, they often exist to help facilitate day-to-day matters. Planting days tied to religious festivals may be an ingenious way of guaranteeing that work is done by a certain day. If God says it must be finished, it must be.

Taste and color preferences are extremely important in the diets of most peasant households. It is not always clear, for example, why cultures prefer certain colors while outright reject other colors. It may be a cultural-psychological matter. In Nepal, for example, large white potatoes are rejected in favor of small red potatoes. Large, white "improved" potatoes are believed to cause a male disease where the testicles reportedly swell to enormous size.

All farming systems are socially or politically controlled, either by the local community or outside government bodies. In many Third World villages, communal populations control planting and harvest dates, field rotations, irrigation, crops and varieties to be planted, and many other important agricultural activities. Attempts to introduce new technology without going through community leaders often end in failure. Frequently, governments control many of the same activities and enforce them through severe sanctions. New technology cannot violate these rules unless the rules are changing or poorly enforced.

7. Do Farmers Believe the Technology Will Hold up Over the Long Term?

Trials are generally conducted in one or two seasons. However, a farmer's view is normally based on the long-

term needs, not on a couple of seasons, and sometimes on generations of experience with the crop and land.

Studies of farmer decision-making show that short-time studies seldom reveal the major stresses faced by small-scale farmers, causing them to "hedge" and continuously look for low risk alternatives. This behavior could mean, however, regular low yield but sure production. The Karimojong of Uganda, for example, face an extremely drought stricken environment that causes crop failure 1 year in 10 and poor yields once in 5 years. They thus continuously opt for a low yielding but a trusted drought-resistance variety of sorghum (Netting, 1974). High yielding varieties must prove their drought resistance to become acceptable. Similarly, in Peru's highlands, where frost damage over 7 years equals losses amounting to 1 year's potato harvest, farmers must think in terms of these probabilities in selecting varieties, not in terms of 1 year. Until a technology demonstrates some stability over time, farmers will remain suspicious.

CONCLUSION

Agricultural scientists and technicians are under strong pressure to generate or identify successful technologies. This is a tough job. The profession demands answers to farmer's problems and at times the pressure to succeed is so strong that answers are sometimes given even when farmers' problems or conditions are not understood. Farmers catch on to this superficiality fast. They know when a technologist is bluffing and hiding behind fancy words.

However, if the seven questions above have been seriously asked and discussed with farmers and their neighbors, agricultural practitioners should have a good idea about a technology's potential acceptability. If doubts arise because the technology conflicts with these socio-cultural aspects, one must not necessarily give up. The technology might be altered to fit the farmer's condition. If it is too costly, it can be made cheaper. If it is too labor and time demanding, the technology can be adapted to make it more efficient. If the farmer is rejecting new ideas because of cultural biases (e.g., a new variety has a foreign name that farmers reject for reasons of national pride), then we should try to remove the bias (change the variety's name).

The point is simple: it is easier to adapt a specific piece of technology or practice to a complex farming system than to ask the farmer to change a farming system to fit new technology.

In the end, the acceptability of a technology depends on what the farmers actually do. This can only be discovered in a final stage of farmer testing where farmers themselves take over the new technology and incur all risks, costs, and benefits. Until this final step is taken, all other evaluations remain only suggestive of the technology's potential.

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5