On-Farm Research:

Incorporating Farmer Innovations into the Research Stream

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Agricultural producers possess valuable indigenous knowledge about their land and production systems. In the daily operations of their farms, farmers often develop innovations to solve problems and enhance production.

But farmer innovations rarely find their way into the university research mainstream. There are at least two good reasons why farmers should play a stronger role in agricultural research at land-grant universities:

· Not all farmer innovations work. There needs to be a means by which farmers can test their ideas with scientific rigor before implementing across the whole farm.

· Researchers need to remain connected to the real world. Unless there is a vital connection to the community they serve, agricultural researchers will spend valuable resources "answering questions nobody is asking" (Bullock, 1992).

Traditionally, land-grant agriculture schools have devoted resources and energy towards integrating research findings into the production stream. The predominant educational model has been top-down: universities generate information and deliver it to farmers via Extension. University research topics rarely originate with farmers. Rather, research agendas are strongly affected by funding sources, proprietary concerns, and increasingly narrow fields of study.

Consequently, the bulk of ag production and natural resource management knowledge generated through university research is done so without the involvement of those who will ultimately be affected by the research. The perception of many farmers is that the land-grant university no longer serves them; other "clients" with deeper pockets have separated the university from the community it was created to serve.

The benefits of active farmer participation in agricultural research are increasingly recognized by farmers and researchers alike. For the past several years, farmers in many states have conducted on-farm research designed to answer questions of direct relevance to their own farming operations.

Much is accomplished through such effort. Farmers gain a greater understanding of their unique production systems and learn to use simple research methods to answer questions on a range of topics. Unfortunately, farmers are limited in what they can accomplish alone. By nature, many research projects require much more time, equipment (e.g. laboratory), and technical knowledge than farmers are capable of providing.

At the same time, land-grant institutions are re-discovering their originally intended purpose - to serve the community through which they are funded. This is among the recommendations of the National Research Council Board on Agriculture's Committee on the Future of Land-Grant Colleges of Agriculture (National Academy Press, 1996).

In another example, the president of the University of Illinois has made it his top priority to reconnect the University to the people of Illinois. Agriculture has become a particular case in point. The effectiveness of the existing channels of communication between agricultural scientists and producers has been called into question (Thornley, 1990). Many farmers feel disenfranchised from the agricultural research process and have been left with no avenue to effectively communicate research needs important to them.

Therefore, some researchers have called for a new model for agricultural research and education based on partnership with producers (Chambers et al., 1989). The participatory research model values both farmer and scientific ways of "knowing," effectively integrating them to generate new knowledge for wiser production and management decisions.

Harwood (1979) describes participatory research with

farmers as a method in which "the major emphasis is on production research, planned and carried out by and with the farmers on their own fields." In such a model, farmers are active participants at every stage of the research process, therefore having a direct impact on researchers and their research programs. In addition, Daniel Selener in his book Participatory Action Research and Social Changes (1997) asserts that participatory research is "a more scientific method in that community participation in the research process facilitates a more accurate and authentic analysis of social reality."

There are seven characteristics of farmer participatory research. It should be:

1. guided by the main goal of developing appropriate agricultural technology to meet the production needs of the small, resource-poor farmer,
2. characterized by farmers actively participating at every stage of the research process,
3. conducted in farmers' fields,
4. characterized by researchers serving in the role of investigator, colleague, and advisor,
5. approached from a systems perspective,
6. characterized by interdisciplinary collaboration between researchers and farmers, and
7. flexible and accepting of innovative methodologies.

The participatory model for research has been in operation successfully in Denmark and the Netherlands for several years (Sclove, 1996). There, groups can go to one of the numerous "science shops" - university-based community centers - and be connected with university researchers who assist them in conducting research designed to provide specific knowledge upon which the inquiring group can act. This marriage of lay-people and researcher provides a successful model for relevant and responsive university service to the community.

At the same time, it enhances the generation of knowledge in ways that would be impossible without the involvement of those who have a practical need for the knowledge and the real-world perspective to guide the discovery process for efficient utility. In the participatory model, research is not done for its own sake or to provide fodder for journal publications. Research is conducted to accomplish clearly defined objectives designed to solve real-world problems.

Closer to home are examples of participatory research being applied to U.S. agriculture. In western Oregon, a group of seven vegetable farmers working with university researchers evaluated an alternative strip-tillage system. The group established side-by-side trials - strip-till versus "grower tillage" - on their fields each year for three years. Farmers used their own equipment to harvest the vegetable crops, and a processing company assessed yield and quality. From nine paired comparisons in sweet corn, researchers found a 78 percent probability of increasing net profit by $75 an acre and a 22 percent probability of losing $30 an acre using the strip-till system, compared to the standard grower tillage systems. Growers and researchers then looked at the yield response on individual fields to evaluate cultural factors that explain the results.

As happens many times, the collaborative evaluation lead to more questions for the group to research. After testing one strip-till machine design for three years, the Oregon vegetable growers pooled their resources and received a SARE grant to build a faster and more efficient strip-till machine to use in ongoing trials. Subsequent experiments will test the growers' new hypotheses. The power of participatory research comes from combining the creativity, experience, and resources of many people to address a common problem.

Another example is the Illinois Soil Quality Initiative (ISQI), the chief objective of which is to "identify and develop measures of biological, physical, and chemical characteristics of soils that are meaningful to farmers and other soil resource users (Walter et al., 1997)." ISQI activities were structured to involve scientists and farmers in developing a research agenda that increases their understanding of agriculture's influence on soil quality.

A board was formed of farmers, farm managers, scientists, environmental organizations, and conservation professionals to give broad direction to ISQI's research agenda. Thirty-five farmer participants volunteered their fields and also contributed to data gathering and interpretation as well as ideas for potential uses for the results. A core group of scientists and technicians gathered, analyzed, and reported data to the board, participating farmers, other researchers, and the public. Communication among all participants occurred via farmer interviews, meetings, and a periodic newsletter. The process was continually adjusted based on feedback from participants. ISQI appears to be a promising model for collaboration between farmers and researchers.

In conclusion, farmer innovations can and should be integrated into the research stream. Both farmers and researchers stand to benefit from a participatory

approach to agricultural research. Though not widely practiced, many examples of successful participatory research do exist.

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