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ABSTRACT

Anthropology and Applied Agricultural Research; Improving the Research Process With Interdisciplinary Collaboration*

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Timely collaboration between anthropologists and biological scientists can be critical to the success of applied agricultural research. Using field experiences from on-farm research in Les Cayes, Haiti this paper argues that anthropological techniques and perspectives and the better understanding of farmer circumstances which these can provide can play an important role in better orienting agricultural scientists and sharpening their research designs. This can contribute to the development of more effective farmer recommendations. However, this can only occur if these scientists are convinced of the importance of our contribution, and some practical suggestions are proposed to increase the likelihood of this happening.

* The views expressed in this paper are those of the author, and not necessarily those of U.S.A.I.D. or the International Maize and Wheat Improvement Center.

Anthropology and Applied Agricultural Research; Improving Research with Interdisciplinary Collaboration

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We are probably all already committed to the idea that the anthropologist's perspectives and methodologies can play an important role in applied agricultural research. But one issue that bears examination is how we, as anthropologists, can convince our biological scientist colleagues that our contributions are important.

In this paper I hope to present briefly some simple (and perhaps obvious) "lessons learned" in this regard in the context of multidisciplinary collaboration in rural Haiti. These conclusions are based on experiences while working with the International Maize and Wheat Improvement Center (CIMMYT) for six years as field director of a multi-disciplinary on-farm research (OFR) team. The words on-farm research are key here, for as Tripp notes there is indeed "a real parallel between anthropological research and field agronomy" (1985;117). In OFR the benefits to collaboration are obvious.

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On-Farm Research in Haiti

Haitian agriculture faces serious challenges. Yields of basic food crops like maize and sorghum are generally quite low, and the use of improved technologies is rare. During recent years production per capita has declined, and rising population has placed great demands on existing resources. Agricultural production has continued to expand onto Haiti's most fragile hillsides, and problems with soil erosion have accelerated. There is an obvious need to identify and encourage the use of improved and appropriate technologies to increase farmers' productivity.

To help meet that need, the Haitian Ministry of Agriculture decided to explore the potential contribution of on-farm research methodologies to the development of appropriate maize technologies for small-scale farmers.[1] An area-specific OFR program was designed for the Les Cayes District in southwestern Haiti to be carried out by the Ministry with technical assistance from CIMMYT and with funding from the Canadian International Development Agency (CIDA).[2]

The program began less than one month before planting time with a rapid exploratory survey of farmer circumstances, or the

natural and socioeconomic environment in which the farmer make his production decisions. The objectives of this survey were to identify some production constraints that offered promising research opportunities, and to define some tentative recommendation domains, or roughly homogeneous groups of farmers for whom a single recommendation might eventually be made.[3] This information was used to generate research hypotheses that were then tested in experiments in representative farmers fields.

CIMMYT emphasizes that the survey team should be interdisciplinary, including at least one social scientist (frequently an agricultural economist) and one biological scientist (generally an agronomist).[4] In the case of Les Cayes however the exploratory survey team was made up of agronomists only. This was because my clearance with the Government was taking some time, and the rains were not expected to wait for the necessary government signatures, not even in Haiti. The team made the wise decision to go ahead with the survey, rather than lose the opportunity to do work during the principle rainy season. It was acknowledged that while the information obtained might not be perfect, it would be far better than none at all. Shortly after I arrived I decided to carry out a more careful and interdisciplinary

farmer survey, and this decision was accepted by the rest of the team.

Following the first exploratory survey the OFR team decided to concentrate research in one recommendation domain, broadly defined in agronomic terms as farmers producing monocropped maize in flat rain-fed land. Production problems that appeared important throughout the domain were identified, and field research focused on improved varieties, fertilization, plant population and method of weed control.

Two groups of factorial experiments were planted to test the initial research hypotheses, variety trials and agronomy trials. The variety trials were designed to determine whether selected introduced maize varieties would indeed outperform the local materials, and ten improved yellow early-to-intermediate cycle open pollinated lowland tropical maizes were contrasted with two local materials. The OFR team applied 50 kg P205 and 80 kg of nitrogen (using urea, at 46% N) to these experiments, though all other cultural practices (e.g. land preparation, weeding) were done by the farmers themselves.

Eight agronomy trials incorporated the remaining experimental variables. Each variable had two levels, the

first representing the prevailing farmer practice for the recommendation domain (as identified in the exploratory survey) and the second an experimental alternative believed feasible for local farmers and yet one that would still allow detection of main effects and interactions, should these exist. This would help the research team determine the validity of the initial hypotheses on priority production constraints, and would give important insights into the kinds of technologies that could be beneficial for area farmers.

As noted above the exploratory survey was done by agronomists only, without the benefit of the anthropologist's (or other social scientist) perspective. Did this make a difference? Let us examine the experiments that were planted in more detail, starting with the variety trials.

Recall that these experiments were planted with nitrogen and phosphorus fertilization, though all other cultural practices were managed by the farmers themselves. The later farmer survey clearly indicated however that the large majority of farmers in the target recommendation domain were <u>not</u> applying any chemical fertilizers to their maize. Why then were the new varieties evaluated <u>with</u> fertilizer in these

experiments? The issue was important because significant interactions between variety and fertilization could exist, and this would make conclusions about the yield effects of the new varieties *per se* questionable. It meant that the introduced varieties were being evaluated under artificial, rather than representative circumstances, and under circumstances that were probably more likely to favor the new materials (selected in Mexico under fairly optimal production conditions), rather than the local ones.

Asking why this happened can be instructive, and can underline how the anthropologist can help in planning on-farm trials. First, the exploratory survey team really was unsure about the incidence of fertilizer use among area farmers. This was surprising, because the second farmer survey left little room for doubt; few farmers applied fertilizers to their maize. However, the second survey paid careful attention to sampling procedures, while the first did not.[5] We later realized that the areas visited for the first survey were not representative of the recommendation domain, on several counts. Most importantly they were areas where cash crops were important, and where fertilizer use was more common. In addition the farmers visited at that time were those who had most contact with the formal extension service, and those whom

the agronomists knew would be most likely to offer a warm welcome and collaboration for on-farm trials. Quite often they were not representative farmers.

I think there is more at work here than simply choosing the "easiest" farmers however, for over time it became clear that the biological scientists on the OFR team really did not appreciate how important differences between farmers were. While sensitive to variations in soil type and slope, they neglected important differences in resource access, and in how such differences help shape farmer production strategies. As an anthropologist I was more prone to look at the people and their needs and capabilities, and to seek out variation within populations and ask how this might help explain observed behavior.

But I think there is something else at work too, reflecting again the different interests and incentives of our biological colleagues. Quite frankly I don't think they really wanted to evaluate these promising new varieties with no additional fertilization, for expectations were high and they wanted results. If the farmers were getting one ton/ha. with their maize, the agronomists would find it difficult to go back to the Ministry of Agriculture with the only marginally better

yields that might be hoped for with no chemical fertilization. That would not be the way to build Ministry support for the project. But with the help of some supplemental data on land tenure and its relationship to fertilizer use (see below), a good (if obvious) compromise was achieved. In all successive cycles of experiments all maize varieties were evaluated both with and without chemical fertilizers.

There were other important issues that touched on the apparently simple question of whether or not to fertilize the maize variety trials. The second farmer survey -- the one with the anthropologist's input -- went into some detail on the relationship between land tenure and resource use, a question not considered on the first survey. We discovered that a significant proportion of area maize fields were planted by sharecroppers, and that existing sharecropping arrangments required sharecroppers to give half the total yield to the landowners. Fertilizer costs, however, were generally not shared,[6] and this meant that marginal rates of return to investment in fertilizer would be substantially lower for sharecroppers than for landowners (Yates 1987).

This new information had an important impact on the research program. First, all economic analysis of returns to

fertilizer in that and in successive years were calculated for both sharecroppers and landowners, that is with full and with half benefits to the same investment. And in fact after three years of research and more than twenty on-farm trials it was clear that nitrogen fertilization (with urea only)[7] offered landowner maize farmers an excellent investment opportunity, offering marginal rates of return well in excess of the opportunity costs of capital.[8] Returns for sharecroppers, however, were not high enough to justify a recommendation. In consequence the final nitrogen fertilization recommendation from the OFR program to the farmers called for the application of 40 kg N/ha (with urea) for landowning farmers only, or for those sharecroppers whose fertilizer costs were proportional to their share of the yield.[9] The recommendation domain was consequently split in two (landowners vs. sharecroppers), based not on natural circumstances but on socioeconomic ones. As suggested above, this information also gave strong support to the argument that all new maizes should be evaluated both with and without chemical fertilizers.

It is clear that here the anthropologist's input affected not only the design of the on-farm trials (in particular the choice of experimental vs. non-experimental variables), but also the definition of the target recommendation domains (which

would help shape future research). In addition the economic analysis of the experimental results was modified, as was, most importantly, the eventual farmer recommendation. I think it is probably fair to say that this recommendation was made better and "safer" with the socioeconomic information on land tenure, safer not only for the farmers of the Cayes Plain, but also for the research team. This was something they appreciated.

There were other ways in which the more intensive and informal methods of data collection which we employ helped shape the OFR program. To cite another, the eventual choice of improved variety to recommend to area maize farmers (La Maquina 7827) was determined not by yield alone but rather by a range of variables, including several non-agronomic ones. It was found that the yellow flints in particular yielded more of the coarse ground maize preferred by consumers, and less of the lower-valued flour more common to the dent maizes. This played a key role in narrowing down varietal selection to CIMMYT's population 27 materials (yellow, flint, early to intermediate cycle, lowland tropical), though taste and color were also carefully evaluated in representative farmer households. We were concerned with how <u>all</u> the people (not just the senior male farmers) responded to the new materials, and the agronomists were fully integrated into all these exercises. As

a result they were not hard to convince.

Talks with the rural women revealed early on problems with hand-shelling the new variety, and this information was fed back to the experiment station seed-selection program. "Ease of shelling" became one of the criteria used in the selection of maize ears for foundation seed, and this problem also encouraged the biological scientists to look for other solutions through local variety X improved variety crosses (with mixed success). Note that here research resources on the experiment station itself were also being shifted in response to the socioeconomic information generated by interdisciplinary OFR. And as an anthropologist I tried to keep in touch with representative area farmers to continually assess their reactions to the new technologies, and this provided important new information on disease problems with the new variety (especially maize stunt disease), problems that were <u>not</u> apparent after fully three years of experimentation in farmers fields. This information helped redirect in a relatively timely way the station work on varietal maintenance and foundation seed production. It also underscored the importance of year-to-year variability in research results, and emphasizes how OFR must be an open and continual dialogue between researchers and their client groups. The anthropologist's

perspective and somewhat unique desire to learn from client groups can contribute much to this dialogue and improve the nature of on-farm research.

CONCLUSIONS

Are there any general conclusions to pull out from this experience with multidisciplinary collaboration in OFR in rural Haiti? First and most obviously, I think it is clear that the better understanding of farmer circumstances which the anthropologist can provide can play an important role in better orienting agricultural scientists and sharpening their research designs. This can contribute to the development of more effective farmer recommendations.

But how can we convince our biological scientist colleagues that our contribution is important? A second conclusion is that one important way is to share joint responsibility for all research decisions, and for implementation of the research program. In the case of Les Cayes the agronomists who accompanied me on the second farmer survey heard from the farmers themselves how important sharecropping is, and how it affects resource use. They were

not any more anxious to deliberately slant their research resources away from the poorer farmers than I was, though they were far less likely to see these differences between farmers, and to understand their implications for research design. And I needed little convincing of the importance of the research on nitrogen fertilization, after harvesting experiments in farmers fields and observing statistically significant differences in yield (at 0.05%) in fully 20 of 22 locations, with good marginal rates of return to investment capital. We should try not to sit safely back on the sidelines, ready to criticize our biological scientist peers when they make the mistakes we are so sure they are bound to make, for in the long run we will make ourselves marginal.

Third, it is clear that this question of joint responsibility is easier to advocate than implement. It almost implies equal status with our biological scientist peers, and this can be a problem. The "aggies" are often the senior members of the team, and the social scientist can be looked upon as one who addresses "fringe" issues (though "fringes" of interest to donors). Often we are not expected to play an important role in the hard decisions on technologies, and on research design. This tendency must be resisted, as we emphasize the socioeconomic context in which these hard,

technical decisions must be made.

We should do all possible (beginning in the planning stages of the research) to maximize occasions for joint activities, and to ensure that we are not left to do "our own thing" while they do theirs. Of course as field director of the OFR program I had little trouble getting the agronomists to go along with me to talk to farmers, but I don't think we necessarily need to be directors for this collaboration to occur. Again, more specificity at the planning stage on the need to fully integrate, in an on-going fashion, information on farmer circumstances would be one clear way to increase our role in multi-disciplinary OFR.

Fourth, we need to recognize realistically however that diffences in perspective between ourselves and our friends in the biological sciences can be fundamental. Take indigenous practices, for example; we all seem to have ingrained in us the idea that existing technologies and practices have evolved over time, and represent a progression of successful adjustments to particular natural and socioeconomic circumstances. With this goes the general sense that if lots of farmers are doing something, chances are that something makes good sense, though the reasons <u>why</u> it does may not be immediately apparent. The

point is we generally give the farmers the benefit of the doubt and assume they are right until proven wrong. Yet many agricultural scientists seem to approach indigenous skills and technologies in precisely the opposite manner, assuming a priori that these need replacement or, at the very least, modification, and that they, the scientists, have the skills and technologies to lead the way.

These differences can be reinforced by how we are evaluated by our professional peers. For example, an agricultural scientist who concluded after years of costly research that he had little better to offer farmers than their own indigenous practices would not be greeted the same way an anthropologist would with that same message, and this can engender suspicion, both of our motives and of our methodologies. And while here the anthropologist might urge the biological scientist to change his technologies to better suit farmers' circumstances, the biologist, in turn, could be more apt to ask how we can help change farmer circumstances to encourage adoption of more productive technologies (e.g. incentive prices). This really isn't a case of putting the cart before the horse, and it is important to recognize that there is much to be said for both positions. We should be careful to avoid what Tripp has called "the anti-technical

bias" (1985;121). A real challenge is to better understand how these different approaches can complement on another, can be coordinated and sequenced more effectively to enhance farmer productivity and incomes. At the field level this means we need to show how the better understanding of farmer circumstances which the anthropologist can provide can help shape research designs to increase probabilities for positive technological change. As this paper has tried to argue, our in-depth (if frequently informal) methods of data collection make us particularly well suited to interdisciplinary OFR.[10]

FOOTNOTES

1. The emphasis on maize in particular (rather than on the entire farming system) was justified given its great importance to area farmers. Maize production received substantial farmer resources, and it was expected that improvements in the productivity of these resources could have important positive impacts on overall levels of farm productivity and income. In addition the concentration on one particular enterprise greatly facilitated field research, though it is important to emphasize that maize was always seen within the context of the overall farming system. Hypothesized systems interactions played a key role in determining promising maize technologies for evaluation in farmer.' fields.

2. For more details on the Cayes OFR program see Edme and Yates (1985), "Research in the Farmers Fields; a case from Les Cayes, Haiti" in Caribbean Farming Systems and Alternatives for Development, Universite Antilles-Guyane, Martinique, pp. 171-79, or CIMMYT (1985), "On-Farm Research Methodologies at Work in Les Cayes, Haiti" in Research Highlights 1984, CIMMYT Mexico, pp. 90-98.

3. For more on the concept of "recommendation domain" see Harrington and Tripp (1984) "Recommendation Domains; A Framework for On-Farm Research," Mexico, CIMMYT Economics Working Paper.

4. CIMMYT's OFR methodologies are explained in "Planning Technologies Appropriate to Farmers; Concepts and Procedures", Mexico, CIMMYT Economics Program (1984).

5. This suggests that the "exploratory survey" as outlined in CIMMYT (1984) may not always provide a good foundation on which to design on-farm trials. Concern for appropriate sampling procedures is especially important when a follow-on formal (or "verification") survey is not anticipated.

6. Cost-sharing arrangements between landowner and tenant farmers vary with particular social relations (e.g. family, workgroup partner) and with the crop planted. High value crops like beans are frequently planted with chemical fertilizers, and here fertilizer costs are generally shared (or the sharecropper receives two-thirds of the yield, rather than one-half). It is not surprising that fertilizer costs were not shared in maize production however, for landowners themselves rarely used fertilizers for that crop. This made good economic sense given the fertilizers that were most available to them, as these were N-P-K blends offering relatively little nitrogen per dollar invested. The OFR team found however that nitrogen was the only element that offered a good yield response, and returns with the nitrogen-rich urea (46% N) were consistently excellent.

7. Yield response to phosphorus was significant (at 0.05 %) in only 3 of 12 locations where it was evaluated, and this variable was eliminated from the research program after two cycles of on-farm trials.

8. Increases in urea sales by the private sector have been nothing short of explosive, with an almost ten-fold jump from 1983 to 1984. Sales volume growth from 1984 to 1985 continued at a very impressive 174%, and urea sales as a percentage of total fertilizer sales jumped from 9% to 36% during that same period. Both the OFR team and the private sector estimate (based on timing of urea sales, and on points of origin of urea purchasers) that at least half this urea is being applied to area maize fields. For more details see Yates, Sain, Martinez (1987), "Addressing Market Imperfections with Farm-Based Policy Research: Fertilizer Provision in Les Cayes, Haiti" in Research Highlights 1986. CIMMYT Mexico, pp. 101-107.

9. Analysis of later levels of nitrogen X most promising variety trials suggested that 40 kg N/ha. would be the best level of nitrogen fertilization to recommend to the target recommendation domain, regardless of the variety planted. N X V interactions were not statistically significant and both maizes gave good returns to landowners using free market urea (188% with La Maquina 7827, 105% with the local variety), though the marginal rates of return fell below acceptable levels with 80 kg N or more. The cycle I and II locational and seasonal variability in response to N similarly argued for the more conservative 40 kg N/ha., despite the fact that 80 kg N/ha did give an acceptable MRR in the combined analysis across 22 sites.

10. Tripp (1985) presents a helpful discussion on "Economics and Anthropology", outlining some of anthropology's unique contributions to OFR. In addition we do tend to place more emphasis on evaluating economic decisions within their social context, and to look at the long-term implications of those decisions. For example, CIMMYT Economics state-of-the-art manual on the economic analysis of experimental data (Perrin, Winkelmann, Moscardi, Anderson (1976), From Agronomic Data to Farmer Recommendations: An Economics Training Manual, CIMMYT Mexico) gives scant attention to the long-term ecological or social impact of proposed technologies, limiting evaluation criteria to the individual's short-term economic rate of return. But what makes good economic sense for the individual can make bad economic, ecological or social sense for society as a whole (e.g. the deterioration of the earth's ozone layer).

OTHER REFERENCES

Tripp, Robert (1985)
"Anthropology and On-Farm Research," Human Organization 44:2 (Summer), pp. 114-124.

Yates, Michael (1987)
"Including the Small Farmer," International Agricultural Development 7:5 (September/October), pp. 10-11.