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CONTENTS

- | | | |
|----------------------------|------|---|
| J. Tendler | 1567 | Tales of Dissemination in Small-farm Agriculture: Lessons for Institution Builders |
| P. Mosley and J. Weeks | 1583 | Has Recovery Begun? "Africa's Adjustment in the 1980s" Revisited |
| P. Athukorala | 1607 | Manufactured Exports from Developing Countries and Their Terms of Trade: A Reexamination of the Sarkar-Singer Results |
| M. F. Bleaney | 1615 | Manufactured Exports of Developing Countries and Their Terms of Trade Since 1965: A Comment |
| P. Sarkar and H. W. Singer | 1617 | Manufacture — Manufacture Terms of Trade Deterioration: A Reply |
| A. A. Nyatepe-Coo | 1621 | External Disturbances, Domestic Policy Responses and Debt Accumulation in Nigeria |
| P. Clements | 1633 | An Approach to Poverty Alleviation for Large International Development Agencies |

(continued on outside back cover)

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Tales of Dissemination in Small-farm Agriculture: Lessons for Institution Builders

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Summary.— This article describes patterns that are discernible across a dozen cases of good micro performance in agricultural research and extension in poverty-stricken Northeast Brazil — research meant to contribute toward a more grounded approach to remedying the problem of mediocre performance of these institutions elsewhere. The good performances involved the presence of demanding “user” agencies outside extension and research; shorter time horizons and more focused tasks; localized credit subsidies with automatic sunset provisions and penalties for nonperformance; a strong presence of municipal elites, normally avoided in the design of such programs; and an equally strong and complementary presence of more centralized public sector actors.

1. INTRODUCTION

The Green Revolution successes of the past 30 years made heroes of agricultural research and extension in Third World countries. This was not the case, unfortunately, in many places outside those areas of mainly irrigable agriculture. In rainfed areas, where poverty predominates, small farming is significant, and environmental degradation is high, the record continues to be disappointing.¹ Much of the investment by governments and donors in agricultural development in these latter areas has not added up to impressive increases in output, yields, or incomes, even though economic analysis suggests that the returns to investment in research and extension should be considerable.²

More often than not, the finger of blame for these disappointing outcomes has been pointed at agricultural extension and research institutions. In the problem cases, monitoring and evaluation reports repeatedly point to research as “too academic,” not concerned about small-farm crops and practices, not sufficiently engaged in field testing and adaptation of its findings, and not interested in collaborating with the extension service in the interests of dissemination. Extension agents, in turn, are often found to have “nothing to extend,” and inadequate experience and in-service training. They frequently spend more time in their offices than in the field — because they are processing the paperwork for credit applications for their clients or because they are chronically short of vehicles, funds for fuel and vehicle maintenance, and *per diem* pay for travel. In the programs that produced

these disappointing results, all these problems had already been identified as the ones to be tackled.

As happens with any such gloomy aggregate picture, there are myriad exceptions. Though they may not add up to dramatic and sustained impacts in national or regional output, there are enough of them to add up to something significant in terms of institutional lessons. With just such a purpose in mind, I studied a 15-year experience with nine large rural development projects targeted on small farmers in the nine states of Northeast Brazil — a poor region the size of France with 45 million people and afflicted with problems of semi-aridity and periodic drought.³ The projects represented an investment of US\$ 3.1 billion, jointly funded by the Brazilian government and the World Bank.⁴ Like similar agricultural and rural development projects in other countries, roughly 40%

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of the investment went for agricultural extension and research, and another 30% for associated agricultural credit. Moreover, the problems facing the Northeast agricultural research and extension systems, as well as the explanations given for disappointing results, were very similar to those reported above.⁵

I asked researchers, extension agents, farmers, and branch-bank managers to identify the most significant instances in their memory, over the last 15 years, of widespread adoption of an improved variety or agricultural practice by small farmers, with significant impacts on productivity and micro-regional output. Roughly a dozen such instances emerged from this process — not all within the nine rural development projects — each one of which I then traced back in time from adoption to dissemination, adaptation, field testing, and research. I then looked for patterns running across these stories.

In several ways, the patterns of better institutional performance revealed by this inquiry did not fit the model of agricultural innovation and diffusion implicit in the critiques and concerns listed above. These patterns raise some questions, then, about current approaches to institution building in agriculture, and point toward some alternative or complementary approaches.

First, extension was not necessarily the agency that carried out the dissemination, or caused it to occur; and research was not necessarily the institution that carried out the field trials and adaptation that facilitated widespread adoption.

Second, one of the intractable problems often identified as impeding successful research and extension — the chronic “lack of coordination” between extension and research — still existed in the success stories and, hence, did not apparently stand in their way. Yet interagency “coordination” continues to be central to the design of agricultural programs, and program evaluators still routinely rue the absence of it in explaining poor performance.

Third, some of the agencies involved in the successful disseminations had actually received consistently poor grades on their overall performance in both *ex-ante* and *ex-post* evaluations by donor agencies. Not only did episodes of good performance arise out of seemingly hopeless agencies, moreover, but stellar performance was often followed by relapses into mediocrity. This contrasts with the view — implicit in the way we think about institution building in the public sector — that the growth of strong institutions is a linear and cumulative process, and results from patient and continuous support over a long period of time.

Fourth, the dissemination stories reported below show that “demand-side” factors — particularly “user” agencies — played important roles in driving research and extension to do better. But agricultural programs generally take a “supply-side” approach to

improving the quality of research and extension — focusing mainly on building up the capacity of these organizations with direct funding and technical assistance.⁶

What did bring about these dissemination successes, if it was not good research and extension agencies doing what they were supposed to do? If the same agencies that did not collaborate on field test, and had nothing “to extend” could suddenly change their character, this suggests that part of the problem had to do with something outside the agencies, or inherent in their particular tasks, rather than only with their capacity. To the extent that many — though not all — of the patterns described below fall into this “outside” or “demand side” category, I am not saying that they are more important than what happens inside agricultural extensions and research agencies. Nor do these findings imply that agricultural planners should abandon the “supply-side approach” to institution building. Clearly, the two approaches are complementary, and one should not be pursued to the exclusion of the other. I am saying, however, that the supply-side approach has been pursued in designing agricultural programs to the relative neglect of the influence of the kinds of outside pressures and task characteristics discussed here. This, despite a long interest in the literature of organizations (and a minor but now growing interest in the development literature) on how these factors influence organizational performance.⁷

This article is organized in the following manner. Section 2 reports on a dozen instances of successful dissemination, and then give some illustrative descriptions of how these disseminations worked. Section 3 describes the patterns that run across the cases, and discusses their implications for institution building. Section 4 provides a summary and conclusions.

2. HOW DISSEMINATION WORKED

Early on in this research, the stories of successful dissemination seemed to be associated with campaigns to fight crop disease — namely, the adaptation and dissemination of (i) a disease-resistant orange variety by the Boquim experiment station in the Tabuleiros Sul region of the state of Sergipe, associated with that region’s orange-led development boom and successful entry into the export market for frozen orange juice; (ii) in various states, an improved variety of annual cotton with associated inputs — one of the Northeast’s major staples — which overcame an epidemic infestation of the boll weevil and, in the process, replaced a perennial cotton variety associated with low-productivity joint production with livestock and subsistence crops; and (iii) a disease-resistant banana variety by agricultural research and extension

in the state of Paraíba, which increased output and productivity significantly in a banana-growing region of the state.

Though tempted to attribute the successes to the "unique" nature of disease campaigns, I soon found even more cases that were not associated with disease-fighting campaigns and yet seemed to have some of the same special characteristics as these campaigns. This section repeats the logic of that path of discovery: the first subsection says something about the successes associated with disease, and the second about those not involving disease. Because so many of the patterns running across the disease cases appeared in one variation or another in the nondisease cases, the lessons of the disease cases are not fully developed until Section 3.

(a) *Diseases, pests, and other scourges*

That state institutions in agriculture have performed particularly well when faced with major problems of disease and pests in important crops is not new. With respect to the cotton boll weevil alone, examples come from the late 19th century British colonial administration in Egypt, the early 20th century US extension service, and mid-20th century French administration in West Africa.⁸ Little has been done, however, to analyze why and how otherwise mediocre institutions rise to these occasions so well, or to apply these lessons toward improving the more mundane, nondisease work of agricultural support agencies.

In the disseminations associated with disease- and pest-eradication campaigns, the successfully disseminated new varieties had desirable productivity-increasing traits beyond their resistance to disease, but the extension service had not been successful at promoting them earlier or had made only half-hearted attempts. The new orange variety noted above, for example, was not only disease-resistant but was also a juice variety ("pear" orange), as opposed to the eating variety ("Bahia" orange) that was the only one cultivated previously; this facilitated the establishment of a juice-processing industry in the region which, in turn, ended up exporting frozen orange juice to Europe and the United States — a first for this very small state. The new cotton variety, in turn, was desirable not only for its resistance to the boll weevil, but for the switch it required from perennial to annual cotton. The perennial plant had been associated with a tradition of low-productivity joint production with extensive livestock (which fed on the leavings of the cotton tree after the harvest) and sharecropper production of interplanted annual subsistence crops. Prior to the campaigns against disease or pests, the productivity of these crops had been stagnant or even declining. Producers

were in a kind of low-productivity equilibrium, with state governments not able or worried enough to do anything about it.

The successful disseminations resulting from the disease and pest campaigns all achieved their results in a relatively short period of time. In Sergipe, almost all orange growers switched from the disease-prone eating variety to the disease-resistant juice variety within three to four years. Cotton production, after falling drastically in the mid-1980s, regained its earlier production levels within four or five years, although only in some states. Most of these cases, in addition, involved cash crops that were already being produced by small farmers, but not exclusively by them. That is, the successful cases did not involve the introduction of new crops, as is frequently attempted by extension programs. Finally, the agricultural agencies of the state governments — agricultural planning, extension, research, credit, input supply, seed production and supply — all played a strong role in mounting the disease- or pest-combating campaigns. They acted with a remarkable degree of coordination and dynamism — exactly what they were faulted for lacking in prior evaluation reports.

Unlike most programs focused on small farmers, the disease and pest campaigns were also of great concern to medium and larger farmers, to the extent that they produced the same crop. This resulted, of course, from the negative externalities of contagious crop disease and pest infestation: if small farmers were not included in the public assistance efforts, infestation in their crops would ultimately spread to the larger farmers. Hence the disease campaigns were forced to take into account the fact that small farmers faced higher prices for purchase of small volumes of pesticides and medicines (these higher prices often prevented small farmers from adopting disease- and pest-eradicating measures), and that they had little access to information about pesticide-applying equipment and its proper use. In the state of Pernambuco, for example, the state organized small "brigades" to distribute a weevil-fighting package to groups of small farmers, paying one farmer to be trained as a brigade leader in the proper use of the pesticide applicator. In Sergipe, the state worked partly through two cooperatives of small orange-growing farmers, also using "brigades." In all these cases, the state agencies made special efforts with small farmers because, as they said, they had to do something more aggressive — if they were to control the weevil — than "simply let the word out" through the extension system.

The public figures and agency managers who spearheaded the disease campaigns had a strong sense of mission because the problem threatened to undermine the economy of certain microregions, regions, or even whole states. *Not* performing well would mean declining tax revenues, losses in employment and its attendant social problems, and the loss of important

political constituencies in affected regions. Civic leaders feared the loss of a sense of regional self in places where economic, social, and cultural traditions were defined by long association with a particular crop — such as cotton in the Northeast states. Regions that were “on a roll” with a relatively new crop — such as juice oranges in Sergipe — saw their visions of a dynamic future dashed if they did not act rapidly. Much of the work of agricultural research and extension agencies — multifaceted and dispersed — is not blessed with the driving force of this kind of strong regional identification and high-level worry about a particular crop.

Finally, these interventions involved an unusual combination of high subsidy and high discipline, which forced the adoption of the new variety. First, that is, farmers received credit at low or negative real interest rates — although no lower than the prevailing rates on official agricultural credit in Brazil at that time — to buy certified seeds, rootstock, or seedlings, and fertilizer and pesticide applicators, and to eradicate diseased plants and put in new ones. Second, the banks, the extension service, and the research agency carefully monitored the uses to which the credit could be put. Borrowers had to show certificates proving they had purchased the approved variety, and applied the requisite fertilizer; or they received credit only in kind, in the form of the recommended inputs. Third, in several cases, the state held monopoly control over inputs. In Sergipe, for example, the agricultural experiment station was able to control the quality of seedlings available in the state’s private nurseries by virtue of the fact that the station was the sole source of the rootstock used to make the graft (from a lemon tree); and the station itself had been responsible for the development of a private nursery sector in the state, previously nonexistent, in that it had selected and trained 60 small farmers to produce the certified seedlings. Fourth, the subsidy had automatic “sunset” provisions — to be terminated when the disease problem was overcome.

In the above stories, in sum, subsidized credit for a particular crop forced changes in cultivation practices and input use that would be automatically self-sustaining, once the subsidy and strong control were dropped in a later period. Moreover, it came with a strong controlling presence from the state’s agricultural agencies — a kind of carrot-and-stick approach. These features contrast sharply with the way agricultural credit and other inputs have been typically subsidized in Brazil and many other countries — indefinitely, across the board, and with little or no performance demands placed on those receiving the subsidy — all carrot, in other words, and no stick.⁹ More generally, the successful use of credit subsidies in these particular cases contradicts some of the current policy wisdom against the use of subsidies in agriculture.¹⁰ The distinction made here between

carrot-only and carrot-and-stick, however, is critical. It is not usually taken into account in the current versions of policy advice, which point to subsidized credit as the culprit for much of agriculture’s problems.

(b) *Dissemination without disease*

Fortunately, pests and disease campaigns were not the only conditions under which agricultural extension and research performed well, as can be seen from the following list:

The successful adaptation and dissemination of (i) an “industrial tomato” by an experiment station in Belém do São Francisco in the state of Pernambuco, suitable for irrigated cultivation in the Petrolina-Juazeiro region of the São Francisco River Valley (Bahia-Pernambuco), a region now considered to be one of the only agricultural growth-pole successes of the Northeast; (ii) an early-maturing dwarf cashew variety by the state research agency in Ceará, disseminated throughout the Northeast; (iii) a fungus-resistant black bean by an experimental station of the state research agency of Pernambuco, widely adopted in the nearby black-bean-growing Irecê region of Bahia; (iv) improved varieties of vegetables by the Limoeiro experiment station in an area of Pernambuco between the humid coast and the semi-arid interior, most dramatically represented in the intensive cultivation by micro-farmers of lettuce, green onions, and cilantro in the Natuba Valley; (v) a cistern for holding rainwater, disseminated throughout the Northeast and developed by the Center for Research on Dryland Tropical Agriculture (CPATSA) in Petrolina, Pernambuco — part of the national system of agricultural research centers (EMBRAPA) specialized in particular crops; (vi) implements for animal traction, also developed by CPATSA and radically modified by the Pernambuco project unit; and (vii) standards used for transformers connecting up small-farmer irrigators to the electric power net, carried out by the Brazilian National Development Bank (BNDES) in conjunction with a local organization in the southern state of Rio Grande do Sul; this led to a transformation of small-farm agriculture in that region from dryland to irrigated cultivation, and a nationwide change in official standards used by power utilities, which made connections easier and less costly for small irrigators.

The dissemination of the rainwater cistern developed by the Northeast Center for Dryland Tropical Agriculture (CPATSA) is a good example of the kind of circumstances that surrounded many of these dissemination stories. It originated in a visit by the governor of Sergipe, shortly after his election, to the CPATSA research center. What did they have “on the shelf,” he asked, that would have the biggest impact on the semi-arid region? CPATSA strongly recommended its cistern, yet to be disseminated.

The Sergipe governor enthusiastically adopted the cistern and embarked on a program to install it throughout his small state — an effort that was subsequently picked up by other Northeast states to the point that CPATSA now considers its cistern to be its most widely disseminated innovation. But when the state's rural water agency started installing the cistern, it turned out to be technically flawed. CPATSA, that is, had clearly not done the field testing and adaptation. Caught in the middle of a highly publicized program to supply water to poor rural households, the Sergipe governor and his water agency could not simply retreat. So the water agency itself carried out the testing and adaptation that CPATSA should have, and came up with an improved model that was also only two-thirds the cost of the CPATSA version.¹¹

A similar chain of events with another mechanical innovation of CPATSA occurred in Pernambuco. One of the project-unit managers took the latest in animal-traction implements from CPATSA. But when the unit tried to introduce this innovation to the small farmers of the region (where CPATSA was actually located), they rejected it because it was too cumbersome to use, and was designed for two animals rather than one; this doubled the requirements for capital and grazing land, a significant burden for poor farmers. The project unit, anxious to get results and not go back to the drawing board at CPATSA, consulted with farmers in the region about the necessary adaptations, and then contracted out iterations of the suggested changes to a local blacksmith. This kind of field testing and adaptation is, of course, what the research center should itself have done before releasing the implement package.

If the user agencies had known that the package they carried away from CPATSA was inadequate, they may not have taken it in the first place. Only because they were caught in a process of having to show results, and were intensely interested in doing so, did they finish what CPATSA had left undone. They valued the returns to be had from testing and adaptation more highly than did the research agency, whose performance was not judged by standards of adoption and dissemination. Section 3 takes the implications of this, along with those of the previous example, a step further.

3. THE PATTERNS

In almost all the cases reviewed here, two kinds of findings stand out. The first involves a transformation of the system of incentives and penalties under which agricultural agencies typically work. The second relates to the "pull" of demanders: the Sergipe governor in the story of the cistern, for example, and the Pernambuco project unit in the case of the animal-

traction implements. The first three subsections below treat the "internal" changes in the agency, and the following four treat the paths of impact via demand. Clearly, as the discussion below will reveal, the distinction between inside and outside is somewhat arbitrary.

(a) *The transformation of work*

Extension and research typically work on several fronts at once — many crops, many inputs, many special programs, and many different specializations. Given all this choice between crops and activities at any particular moment, the agencies pay more attention to one crop or problem than another, depending on the circumstances of the moment or the preferences and expertise of the head of a particular local extension office. Often, the agencies do not have clear and confident proposals about what to do about "low productivity," nor do they have firm control over the supply of inputs that is usually required for a "modernizing" technology to be profitably used. The performance of agricultural agencies, moreover, is customarily judged in terms of inputs rather than outputs — number of farmers visited, farmers attending courses, field trials, and demonstration plots, rather than rates of adoption of new varieties, observed yield increases, or transformations of the local agricultural economy. The agencies suffer no particular penalties for failure to perform in these latter areas, nor is their behavior driven in any way by fear of the consequences of poor performance.

Disease campaigns change all this. The epidemic dictates the crop, the problem, the region, the package of inputs and practices that have to be applied and that are dependent on the cooperation of the input-supply network — temporarily narrowing down the work agenda to one crop and to a specific problem with that crop, and assuring adequate funding for recurrent expenditures. The disease problem itself stipulates an eventual end to the activity, measurable in terms of results — the number of diseased trees eradicated, the number of acres planted in the new variety, reduced incidence of the pest in the region, increases in output of the crop. In addition, the end can be reached, usually, within a period of time shorter than the five to eight-year life span of many agricultural or rural development projects. Finally, the anti-disease package takes a more concrete form — seeds, root-stock or seedlings, and fertilizer, pesticide, and pesticide applicators — than the changes in cultivation practices that often dominate the recommendations made by extension agents to small farmers. Though the latter may be just as desirable in productivity-increasing terms, they do not have the appeal and tangibility that the "hard" inputs do. In a sense, then, dis-

ease campaigns make it easier for agricultural extension services to perform well — something that was pointed out almost a half a century ago by Baker (1939) in describing why the Southern Branch of the US Extension Service had a more successful start than the Northern Branch.¹²

The subsidies built into the disease package, and the reduction in transactions costs to adopting farmers brought about by the temporarily heavy presence of the state in the disease-stricken zone, reduced the costs of adoption significantly in comparison to more normal times. This helps explain why states and growers who had done little for years about low productivity in certain crops could be jolted into highly effective action that, among other things, succeeded in transforming agriculture. Ideally, of course, one would not want to wait for crop disease and pest infestations to mount successful programs of agricultural assistance to small farmers. But focusing on disease and pests would certainly not be a bad start, particularly until a wobbly agency gets onto more solid ground.

The literature of induced innovation stresses the importance of powerful grower groups in determining the paths taken by agricultural research institutions.¹³ But in the epidemics of disease and pests, the independent concern of state and regional actors about the fate of the regional economy and declining tax receipts seemed at least as important as grower demands themselves. Granted, the literature of public choice also shows how Third World states have acted independently of farmer interests in order to raise revenues. But this literature, in concentrating on explanations for rent-seeking behavior in the public sector, focuses mainly on how such state actions penalize agriculture.¹⁴ With the disease campaigns, in contrast, the state's worries about raising tax revenues led to actions that favored agriculture.

(b) *Up from mediocrity*

The disease campaigns reveal successful performance coming from mediocre institutions. This is exactly what happened in a nondisease story from another part of the world, with respect to the extension agencies that participated in the highly successful dissemination of Green Revolution varieties in South Asia. They also looked listless and mediocre immediately before their success.¹⁵ Equally mysterious is the sudden fall into dark times by public agencies just when they seem to have arrived into the realm of responsible and effective behavior. These kinds of forward jolts and reverses in the building of public sector capacity often appear quite visibly in the monitoring reports for development projects, if they cover a long enough time period.

The lapses back into poor performance often trigger requests from technical assistance providers and project officers for follow-on projects and for longer implementation periods — in the case of the Northeast projects, from five to eight years. Institution building, these requests typically state, takes more time and care than we thought; things are proceeding slowly, although they are not yet there. But this implicit linear and cumulative theory of how agencies become capable does not fully explain the patterns reported here. The disease stories provide one possible clue to the rest: the task during the successful episode is somehow different from what the organization normally does, and/or the nature of the demands made on the agency during that period are quite different. Conversely, mediocre performance might be explained the same way, meaning that devoting more time and attention to helping an agency to continue to do what it has been doing all along might not lead to significant improvement.

If all that was necessary to produce the dissemination successes of the disease campaigns was the catalytic effect of a state concerned about disease, does that mean that Northeast research and extension were doing something "right" all along, the poor grades notwithstanding? Without the benefit of hindsight arising from these successful episodes, this "something" would not be noticed during the prior mediocre period and evaluators would have no reason to interpret anything about the agency as "right." In order to fully understand the lessons of the dissemination successes, then, it is as important to understand what was being done right during these longer, mediocre periods as during the more dramatic episodes. This is not to say that what looked mediocre was, with hindsight, actually excellent — although that is one conceivable conclusion. That is, although the successful episodes may all exhibit a distinct pattern of short duration, narrowing, concreteness, high penalties for failure, and easily measurable output, this may be only half the story — albeit a neglected half. The more difficult part to discern, and program for, may be the ongoing qualities of an organization that allow the flares of success to occur in the first place.¹⁶ Laying so much stress on the nature of these episodes, then, is not to argue that an enduring agency can be built only by arranging a long string of such episodes — although that might not be a bad way to start.

It is not obvious, in sum, how to integrate the successful with the mediocre, and the episodic with the ongoing, in a viable institution-building strategy. More could be learned about the issue, as a start, by asking evaluation officers and researchers to routinely identify at least one antecedent to a current success in a former period of mediocrity. This would help us to construct a model of institution building that is closer to reality than the linear model underlying our project designs today.

(c) *When research disseminates*

Researchers themselves played important roles in some of these stories of dissemination — stepping out of their stereotypical “isolation.” This happened, in part, because there is nothing like a major research breakthrough to make research more interested in dissemination. The research agencies and individual researchers who made significant breakthroughs — such as Ceará’s dwarf cashew and disease-resistant banana, Boquim’s improved orange, and Belém do São Francisco’s industrial tomato — were fiercely proud of them. They wanted to get their due credit and show their results off as much as possible — and hence to be conspicuously present in the dissemination effort. At these moments, and around these particular breakthroughs, research lost its reclusive character. Word of its breakthrough spread rapidly in the informal research and extension networks throughout the entire region — not just inside the state — and extension agents appeared from all over with requests for the new variety.

When some of Bahia’s extensionists heard about Ceará’s breakthrough in cashew, they rented a truck with their own money and drove there to buy as many of the new seedlings as they could. Extension agents from the Irecê region in Bahia swarmed around the Belém-do-São-Francisco research station in Pernambuco to acquire its new fungus-resistant black-bean variety, about which word had also spread quickly. When the Paraíba project unit was looking for something to improve productivity among the small banana producers of the project region, they heard about Ceará’s disease-resistant variety and contacted that center directly.

Many of the stories about successful research findings and their dissemination started, actually, with a telephone call by a researcher or extensionist asking for advice from a colleague in a sister institution outside the state. Moreover, a majority of these calls even went outside the Northeast region to Piracicaba in one of the country’s most advanced states, São Paulo, home of Brazil’s oldest and most prestigious state research institute, Escola Superior de Agricultura Luíz Queiróz. This latter pattern, by the way, suggests that there are strong institutional “spread effects” from the richer part of the country to the poorer, contrary to the common portrayal of the Northeast as stagnant and isolated from the dynamism of the more developed part of Brazil. These cross-state paths of dissemination also revealed a pattern of implicit specialization by state research agencies — Ceará for dwarf cashew and banana, Boquim in Sergipe for oranges, Belém do San Francisco in Pernambuco for black beans and industrial tomatoes.

The cross-state collaborations and disseminations represent moments when research wants to be more applied and open and when extension is enthusiastic

about collaborating. But the model of agricultural extension and research behind the typical agricultural development project tends not to take advantage of these particular moments. Understandably, that is, each Northeast rural development project tried to build up a self-contained research-and-extension establishment within each state or region, with a broad agenda of crops and activities; and each project tried to forge a collaborative link between extension and research within that state. Though this might be desirable and even necessary as a longer term agenda, it does not help state research centers to spread their most impressive successes beyond state borders. To facilitate such developments, project designers might make funds available to research agencies for choosing one or two of their already-proven successes and doing more applied and dissemination work with only them. This would amount to funding research centers for particular tasks in which they already had a strong interest in being applied.

(d) *Demand-pull performance*

The changed behavior of the researchers described above arose not only out of their elation over their research successes. It was also rooted in their important nonresearch roles as civic leaders, grower representatives, and “boosterists” of local development. In this latter role, in a sense, they can be seen as falling in the same category as other “demander-users” of extension and research — such as those in the stories of adaptation and dissemination of the CPATSA innovations told above. Other examples of the role of demander-users in the dozen dissemination successes listed above are the following:

(i) Large food-processing firms in São Paulo contributed, along with the university there, to financing the industrial tomato research project at the Belém-do-São-Francisco experiment station. (ii) The Arcoverde experiment station in Pernambuco, which came up with one of the most applied small farmer-oriented research agendas in the state, did so only after being invaded by a group of peasant farmers of the area; they would not leave the station, they said, until the station’s management would hammer out a research agenda that was more relevant to small-farmer needs. (iii) The project-coordinating unit in Pernambuco, under heavy pressure from the governor to “do something for small farmers,” put together a set of teams to do “quick-and-dirty” assessments, county by county, of crop problems and potential bottleneck-breaking interventions; out of these assessments came a set of applied, miniresearch tasks — with dissemination and “short-term results” within a crop cycle or two being the specified end product. (iv) In addition, in an example from outside my set of cases, the Northeast Development Bank (BNB) contracted the Center for

Agricultural Sciences of the federal university in Ceará to develop "fundable" varieties of small live-stock and of livestock forage adapted to that semi-arid state and, most significantly, required and financed the extension work necessary to field test and disseminate the results. This resulted in the only widely disseminated varieties coming out of a group of university agricultural programs in Brazil supported over a 20-year period by the US Agency for International Development.¹⁷

Grouping these examples into categories of demand show that the most influential demanders behind the successful disseminations were (i) other public agencies themselves, or individuals or groups of individuals within them; (ii) medium-sized commercial farmers who produced the same crop as the small farmers (oranges in Boquim, black beans in Irecê, cotton in various states) and who, as local elites, had a strong influence on experiment stations in their region and other field offices of state agencies; (iii) elected leaders — governors, legislators, mayors — who increasingly viewed small farmers as an important constituency, and who were looking desperately for "productive" approaches to rural poverty, which was becoming more and more of a fiscal and political burden on their administration; (iv) the World Bank which, by insisting on a small-farmer orientation in a large investment program over many years, had empowered a generation of government technicians sympathetic to these concerns, and had given them considerable project experience in this area; and last and, unfortunately, least (v) small farmers themselves. Since the role of government agencies as demanders has already been treated in the stories of disease campaigns and the adaptations of the CPATSA innovations above, the rest of this section deals with user-demanders at the local level.

(e) *The local connection*

Local actors and institutions played an important role in the cases of successful dissemination — mayors and municipal governments, vocational schools, Rotary clubs, cooperatives. In some cases — as with the director of the Boquim experiment station — the important local actors were researchers at experiment stations who were born or raised in the area, or who had lived for many years there; they also played important civic roles in their towns — they were perhaps small commercial farmers themselves, officers in local civic associations, or even mayors. They worked to promote the development of their municipality or region in general, and their interest in disseminating improved varieties and practices came out of a larger passion for bringing "development" to where they lived.

The Boquim experiment station played a central role not only in developing and disseminating improved varieties of oranges and the crops customarily interplanted with them, but also in attracting juice-processing firms to the region, partly by successfully lobbying to secure public subsidies for them. Ultimately, this made it possible for the region to tap into the lucrative export market for frozen orange juice. The station management's sense of strong regional identification and developmental mission drew it out of its experimental plots and into the fields of growers — in a way that Northeast Brazilian research institutes had been faulted for not doing.

The handful of agricultural researchers manning the Boquim station referred to themselves as "sons of Boquim" — proud of their region, wanting it to progress, taking responsible positions in the local orange-producer association and in town government. The director of the station, born and raised in Boquim, came from an orange-grower family, organized and headed the regional association of orange growers, and ultimately became a dynamic mayor of the municipality of Boquim. He and the others at the station longed for their tiny state to "beat the competition" — namely the very large neighboring state of Bahia, at that time a significant producer of oranges — and from whence the improved orange variety had originally come. David-and-Goliath-like, the sons of Boquim wanted to "show up the Bahians" — whom they considered to be "lazier" than Sergipans.

In another example, the president of a successful cooperative in the Irecê region of Bahia came from a prominent commercial farming family in the region. Though holding a university degree in agronomy from the state capital, he had moved back to the more provincial Irecê to teach at the agricultural vocational school there, rather than go on to a career in agricultural sciences at a university or research center. He used the school and his classes as a mini-experiment station for testing varieties and practices that he then disseminated to small farmers through the cooperative.

Finally, the success of the National Development Bank (BNDES) in coming up with workable standards for the transformers for small irrigation pumps, and in getting them accepted by the state utility, depended on the enthusiastic participation of engineers teaching at the local vocational school, far from the capital city and its prestigious engineering university. The BNDES had previously tried in vain to interest the engineering department of the state university to do this work under contract; only as a "second-best" approach did it end up contracting the engineering teachers of the vocational school instead.

The local institutions of these stories, in sum, were less sophisticated and prestigious than the institutions through which donors and governments usually fund agricultural research and try to influence it in a more

dissemination-oriented direction — universities and state and federal research centers. To the latter, applied work is often viewed as second-class, low prestige. The more modest local actors, in contrast, were eager to do applied work because they were concerned about the fortunes of their region, and because their prestige and status came from making things work where they lived.

The history of the Boquim station provides another insight into the difficult problem of getting researchers to do more applied work. In contrast to most experiment stations in the Northeast, the origins of the Boquim station were in dissemination and not research — a fluke of that region's particular history. The station was set up in the early 1970s as a mere "promotion station" for the new improved orange variety developed in the 1960s by the citrus research center at Cruz das Almas, in the neighboring state of Bahia. (At that time, the region around Cruz das Almas also grew oranges.) As a result of these applied beginnings, and the central role played by oranges in the dynamic expansion of the Tabuleiros Sul region,¹⁸ Boquim's subsequent research always had an applied style.

The Boquim station's sequence of institutional growth — "backing into" research from promotion — is just the opposite of the approach taken by those designing agricultural research and extension programs. The latter try to push research agencies to move "forward" into more applied work. But whereas Boquim's origins and concerns caused it to place a high value on moving "backward" from application to research, there is nothing about the origins of most agricultural research centers that would draw them from research toward promotion.

The lessons of the Boquim story, together with those told above of the CPATSA cistern and animal-traction implements are twofold. First, supporting more applied agencies to do field testing and adaptation may sometimes be more effective in bringing about the promotion and dissemination of research results than trying to cajole uninterested research institutions themselves into being more applied. Second, when researchers have combined roles as researchers and promoters of local development, they are particularly likely to be interested in applied work.

(f) *The elite question revisited*

The importance of local boosterism in some of these stories of agricultural dissemination raises another set of issues. The "boosterists" who drove the search for better agriculture and its dissemination were local elites — university-trained agronomists who were sons of medium-sized farmers in the region, locally born and bred agricultural professionals work-

ing in the field offices of state agricultural agencies, teachers in local vocational schools, mayors. But project designers concerned about poverty have often shied away from local elites, for two reasons. First, given the chance, local elites have tended to appropriate the benefits of targeted projects and often act against the interests of small farmers and the poor. Second, municipal governments have tended to use such programs for purposes of political patronage, and to be technically and administratively weak. For these reasons, rural development projects are often designed to bypass local government in order to work "directly with the poor" — cooperatives, farmers associations, and rural labor unions. In addition, but never mentioned in these "technocratic" justifications for avoiding local government, state and central governments want to reserve for themselves the rich patronage opportunities provided by rural development projects, rather than share them with municipal governments, regardless of their party loyalty. The bypassing of municipal government — and, indeed, of all levels of government — is even more central to the work and philosophy of nonprofit organizations working with "grassroots" groups.

The fear that local elites and better-off farmers will divert programs away from the target group is well founded. The evaluation literature is replete with case studies documenting this problem.¹⁹ The lesson to be learned from the presence of local elites in the dissemination success stories, then, is not simply that important local actors should be allowed to occupy more space in these projects. In addition, a closer look at the successes shows that other factors pushed them in a small-farmer direction. First, the interests of local elites and small farmers in these particular cases partly overlapped because small and medium-sized farmers produced the same crop and in the same way — oranges in Boquim, cashews in Ceará, black beans in Irecê. In the orange case, it also helped that a large number of medium-sized farmers actually intercropped their oranges with passion fruit and cassava — interplanting usually being limited to small-farm and subsistence agriculture. The Boquim station, then, paid very serious attention to developing varieties of these three crops that did well under intercropping — contrasting with the usual story of agricultural research working to improve varieties that do best mainly under monocropped systems.

Second, the externalities of contagion in the disease and pest campaigns resulted in strong public support from small *and* larger farmers while at the same time keeping the latter from appropriating program benefits because of a project design that was of practical use only to small farmers. As a result, the campaigns did not follow the course of many untargeted agricultural programs, in which subsidized services and inputs had ended up largely in the hands of larger farmers. Under these circumstances, moreover, small

farmers could be "targeted" without all the costs and problems of administrative targeting inherent in many such projects.²⁰

Third, and finally, certain public programs at the state or central government level offered financing to developmentalist local actors only on condition that they include small farmers — much as the US poverty program of the 1960s offered matching grants to cities that invested more in poor neighborhoods (Marshall, 1982). For example, the Irecê cooperative in the state of Bahia asked the state government for access to irrigation funds for financing individual tubewell purchases by its medium-sized farmer members. But the agency, as agreed to with the World Bank, had insisted that financing for tubewells could be granted only in a way that served groups of smaller farmers, and not just individuals. Though the cooperative was disappointed at this stricture, it nevertheless enthusiastically oriented its irrigation program in a smaller farmer direction: this was the only way it could obtain funds for irrigation and, importantly, find a new way of expanding its membership. The coparticipation of local actors in these kinds of centralized initiatives, in turn, made the outcomes better than they would have been if the state had been working on its own: the local actors had a certain kind of experience, understanding of local markets and production systems, and intense desire for their regions to prosper, that state and central government agencies did not.²¹

The last decade of literature on decentralization, local participation, and privatization has done an excellent job of focusing our attention on the importance of the kind of local action described above. The stories of this section, however, are saying something more. All the local initiatives reported above were elicited by something that more central levels of government were doing — in the form of conditional finance, technical assistance, arm-twisting, and sheer inspiration. In addition, this more centralized presence changed what local actors would have done by themselves. My rendition of what works better, in other words, involves more than focusing on a unidirectional movement of activity from central to local, as occurs in much of decentralizationist policy literature and advice. It requires, instead, a particular combination of central and local that changes the role of the more central government unit — regardless of whether it reduces that role — to elicit a form of local action that is different from business as usual.

(g) *Farmers as silent users*

In general, small farmers themselves were conspicuously absent as demanders in these tales of "induced" dissemination. This is not an unusual finding, though it is somewhat surprising, given that "civic society" in Northeast Brazil demanded and

partly succeeded in gaining a major redesigning of the region's rural development projects in the mid-1980s, precisely on the grounds that they were not "participatory" enough.²² In general, and despite the considerable attention paid recently to the importance of farmer feedback to extension and research,²³ there is still little participation of small farmers in the agenda-setting of research and extension offices, and little contracting of research and extension by farmer groups. It is important to understand why this is so, and to find out what there is to learn from the few cases of "user-centered" extension encountered in this review.

Today, some Northeast states are experimenting with a new arrangement that comes closer to a "user-demand" approach to extension, which might be seen as a variation on "performance contracting." At the county level, the project agency works out an agenda for research and extension with a farmer association, which then contracts those agencies for a fixed period to carry out the tasks specified therein; in some of these cases, farmers even specify the particular extension agent they want. These experiments represent one way of funding extension and research through the demand side.

Performance contracting by users is often not easily carried out in poor regions and with small farmers because private extension services do not exist. When they do, they may not know much about, or be interested in working with, small-farm agriculture. Public agencies that operate in the agricultural sector, therefore, have to play a significant role in bringing their client-farmers together and in funding their (the extension service's) own contracts — as is happening in the Northeast experiments — thus reducing some of the arms-length advantages of performance contracts. Even more problematic, these agencies see this process as a disturbing transfer of decision-making power from themselves to their clients, who now get to say what crops they should work on, and where extension agents should be assigned. For this very reason, and not surprisingly, the agricultural extension agencies of Northeast Brazil have not welcomed the idea of receiving funding through contracts with farmer groups, even though informal versions of such arrangements already exist.

Anyone who does fieldwork in rural areas knows that an informal version of what the Northeast's extension agencies are resisting has already been taking place for some time, and in many countries. Namely, groups of farmers ask particular extension agents to visit and advise them in return for payments for gasoline, repair of the agent's vehicle, food and lodging, or for other side payments. The phenomenon of "privately contracted" extension visits of public servants, of course, raises questions about propriety and about who does not receive extension advice as a result. But they also reveal that small farmers are will-

ing to pay for some kinds of agricultural extension (including particular extension agents). In addition, they help to make extension and research work more effectively — since without them, extensionists often have to stay in their offices rather than visit farmers because of the lack of funding to buy gasoline and repair their vehicles. Finally, some extension agents reported liking their jobs better and feeling more effective when they worked this way: their client-farmers presented them with a clear and manageable list of what they wanted them to work on, in contrast to the much broader, open-ended agenda of activities formally given them at work.²⁴

Though the “informal contracting” described above might be seen as compensating in the short run for the chronic lack of operating funds suffered by extension agencies in many countries, it is rarely acknowledged by agricultural officials — let alone suggested as a basis for improvement. To do so would be to reduce the control of extension agencies in determining what they work on and what farmers they visit. This resistance to contracting with user-clients might perhaps diminish if funding and organizing assistance could be provided to the farmer groups through different agencies — nongovernment organizations, or other public agencies operating in rural areas, such as public works, health, and disaster relief. Though such an arrangement might seem novel, the informal contracts described above are often financed precisely by just such entities. Although farmers sometimes pool their own money to fill the extension agent’s gasoline tank, that is, they often use funds provided by *other* parties — nongovernment organizations, public sector “community development” programs, and so on.

As some of the examples preceding this section show, agricultural agencies were perfectly comfortable doing contract work for other public agencies from time to time when this was not part of a *strategy* to delegate some of their decision-making power to others. A more fruitful way to think about a strategy of performance contracting by user-farmers, in other words, would be to not pursue it only as a strategy for the agricultural agencies themselves. Rather, outside funders might aid and abet the emergence of outside demand for such contract services by funding other agencies and farmer groups to “buy,” among other things, extension services.

4. SUMMARY AND CONCLUSIONS

This detailed look at the institutional history of several small successes in agricultural extension and research revealed the following patterns:

First, the better performing agencies were subjected to “benign” shocks from demanding users — not necessarily from the final users, the farmers, but often from more powerful “intermediate” users such as gov-

ernors, development banks, and other public agencies. They played important roles in driving research agencies to do what they normally did not do enough of — field testing, adaptation, and dissemination for small farmers — either contracting research agencies to do applied work on specific crops and problems, or actually doing the applied work themselves.

Second, circumstances changed so as to impose very short time horizons on these agencies, in contrast to the more tolerant timing of institution-building projects — epidemics of crop disease or pests, impatient governors wanting “results” before their term of office was over, or simply excitement in a particular locality about making development “happen” at that moment. These pulls and pushes were sometimes more effective in eliciting good performance than the permissive tolerance of long-term, “supply-side” support.

Third, the “demand shocks” resulted in a temporary transformation of the work of research and extension agencies from a diverse and wide-ranging menu of activities — something for every crop and every type of farmer — into a narrow, highly time-bound agenda of work on one crop, one problem, and/or one micro region. Under these conditions, workers often liked their jobs more — a not trivial consideration, given the current concern about poor performance in the public sector. These changes in the nature of the task and the work environment were similar to the alleged advantages of “performance contracting” — namely, clearly specified tasks, closed time periods, conspicuous indicators of results, and clear penalties for nonperformance.

Fourth, for similar reasons, localized credit subsidies played a surprisingly important role in bringing about rapid and widespread adoption by small farmers in a short period of time. On closer examination, these particular cases of credit subsidy show an unusual combination of high subsidies and high penalties for nonperformance, not unlike the East Asian countries’ successful use of credit as a tool of industrial policy.

Fifth, municipal-level actors and institutions played important roles in these stories of above-average performance — mayors, rotary club presidents, vocational schools, cooperative presidents, rural labor-union leaders — unexpected because they were not included in the project design. Researchers themselves were more interested in applied work the more they were involved in local development initiatives, and had combined roles as local civic leaders.

Sixth, the above finding would seem to reinforce the current view that the more you decentralize, privatize, and participate, the better. But that was only half the story. Standing behind each strong local actor was a more centralized government agency — offering financial incentives, talking up the desired new approaches, providing technical assistance, rewarding the good performers and keeping funds away from the bad ones.

Seventh, though "user-centered" approaches to agricultural extension (and sometimes even research) are in vogue today, and with good reason, agricultural agencies resist being contracted by farmer groups because they view this as reducing their power. At the same time, an informal and officially unacknowledged version of such contracting already exists.

Planners often look at the kinds of findings described above as outside their control, and hence not subject to being "tamed" by their program designs or institutional support. The following list of possible actions, though not exhaustive, suggests that many of these outside forces are more easily subject to taming than one would think.

First, instead of exclusively funding agencies directly and treating them as self-contained entities to mold and shape, projects can also influence these agencies by channeling funding through their users. Strong agricultural research capacity, obviously, cannot be treated simply as the by-product of contracts with development banks or other public agencies. But such programs do provide an excellent opportunity to make research and extension more responsive, and agriculture more productive, by administering strong doses of user demand to extension and research institutions.

Second, and in the same vein, projects could fund farmer groups to contract for agricultural extension (and perhaps research), providing the funding through agencies other than the extension service or research — such as nongovernment organizations, community development programs and so on, whose grants to grassroots groups are often already used informally to "contract" individual extension agents.

Third, the design and cycling of agricultural development projects might try to mimic the distinctly episodic and narrow character of the achievements recounted here — and not just provide open-ended, ever-present support for a variety of crop interventions over a permissively long period of time. Projects could be timed, for example, to fall within the election cycle of governors, to take advantage of the dynamic push that such politicians often bring to intervention campaigns involving particular crops, regions or problems. In the same vein, project planners should look for crops and crop problems in any particular country or region that promise easy first

successes. This does not necessarily mean shorter projects, or rigid work agendas for research and extension agencies; it can simply mean the breaking up of a project into shorter segments, the subsequent segment being decided upon after completion of the first one, and the experience and learning that it provided.

Fourth, because researchers themselves often become more interested in field testing and adaptation at moments when they think they're onto something really successful — or when they see themselves as "native sons" of the localities where they work — projects could make funding available to research agencies or experiment stations to adapt and disseminate the most promising variety emerging in, say, the last two or three years. They might use the funding for field testing, seed production, or for trucking in extension agents from a variety of places for a special previewing — activities not normally seen as "belonging" to research.

Fifth, and finally, program planners might look more to the "low-status" local vocational schools and colleges in the micro regions where rural development is being promoted — as distinct from the higher quality and more prestigious educational institutions and public agencies of capital cities, which are usually the principal actors in area development projects.

All this may seem to go against the grain of what we think of as wise practice — assigning tasks to the agencies specialized in doing them (field testing to the research agency, dissemination to the extension agency, and so on); protecting agencies from "meddling" by politicians; developing a long-term plan of work that includes a variety of crops and initiatives, partly to take into account the very complexity of the small farm. Moreover, the kinds of short bursts of performance encountered in this research — and the demand shocks that sometimes bring them on — may not be enough to build an institution. But the success stories of institution building in agriculture — such as that of Brazil's research parastatal, EMBRAPA — tend to result from years of lavish institutional support to a single agency, and not from support embedded in an area development project in which more than one agency is involved. Agricultural, rural, and area development projects, in other words, present significant opportunities to build institutions in research and extension, but not in the expected ways.

NOTES

1. See, for example, World Bank (1987), World Bank (1983) for the Northeast Brazil projects, and Johnston, Hoben and Jaeger (1991) for Africa. See also numerous supervision reports and evaluations on agricultural and rural development projects in World Bank files.

2. See, for example, Birkhaeuser, Evenson and Feder (1989), and Echeverria (1990).

3. For treatments of Brazilian and Northeast poverty, see Fox and Morley (1990), Denslow and Tyler (1984), Hoffman (1986), Hoffman and Kayegama (1984), and Thomas (1987). For treatments of Northeast agriculture, see Homem de Melo and Canton (1980), Johnson (1971), Katzman (1984), Kutcher and Scandizzo (1981), and May (1986).

4. Field work for this research was carried out in Brazil by the author, as part of a larger research project, during

three five-week periods in the late 1980s, in addition to a one-month period in the state of Ceará in the summer of 1992. The findings of the larger project appear in Tendler (1993).

5. For agricultural extension and research issues in Brazil and the Northeast, see World Bank (1983), Alves (1988), Evenson (1989), Sanders and Ruttan (1978), and Homem de Melo (1986).

6. I am using "supply-" and "demand-side" in the sense of variables internal and external to an organization, respectively, rather than in the sense of different approaches to macroeconomic policy.

7. Perhaps this neglect is due, in part, to the fact that much of this organizational research was carried out by academics in business schools and sociology departments, and mainly among private firms rather than public sector agencies. Lawrence and Lorsch (1967), Thompson (1967), and Pfeffer and Salancik (1978) were seminal contributions in relating the performance of organizations to their external environments, and to the relative ease or difficulty of their tasks. A seminal contribution in the development field was Hirschman (1967), in the course of writing about large World Bank projects; see also Tendler (1968) with respect to electric power generation and distribution by public sector enterprises in Brazil, Lamb and Muller (1982) with respect to the Kenya Tea Development Authority, and Israel (1987) with respect to institutional development in World Bank projects.

8. See Hirschman (1981), p. 81, citing Owen (1969), p. 215 for Egypt; Baker (1939) for the US Extension Service; and de Wilde (1967) for Francophone West Africa. (I thank Carl Eicher for drawing my attention to the latter citation.)

9. This distinction parallels that between Latin America's import-substitution policies and those of East Asia. Contrary to earlier interpretations, the East Asian countries were as lavish as Latin America with tariff protection and credit subsidies for industry. But they were also highly selective about the sectors and firms to which protection was granted, and very demanding of performance; if a firm's output or exports did not increase within a year or two, the subsidies were abruptly withdrawn (Amsden, 1989). Latin America, in contrast, offered more across-the-board protection with less selectivity and fine-tuning and no demand for performance (Sachs, 1985).

10. See von Pischke and Adams (1983) and Krueger (1991).

11. The case material on the cistern was developed by Beteta (1990). The water agency's various iterations of the cistern finally ended up with the "chinese-hat" form, which was superior in that its conical shape avoided the stress points in the corners of the previous rectangular version, which had caused leaks and required difficult repairs; the concrete, conical roof was maintenance-free, in contrast to the tin sheeting or wooden beams of previous forms, which were also frequently stolen for roof repairs; the concrete "hat" eliminated the need for plastic sheeting, subject to tearing, which was used to cover the brick-walled, rectangular and tin roof-covered versions and to seal their interior; and it held significantly more water than CPATSA's cistern.

12. Baker describes the origins of the Southern Branch of the US Extension Service in the first quarter of the 20th century in a dramatic campaign against the cotton boll weevil, and attributes the "good start" of that service to the "easiness" of that first campaign, in terms of its highly standardized and homogeneous mission. She contrasts this with the more "difficult" evolution of the Northern Branch of the extension service, where each state developed its own particular multifaceted work agenda, partly because of the greater heterogeneity of agriculture in the North.

13. E.g., Binswanger and Ruttan (1978).

14. The state marketing boards for export crops in sub-Saharan Africa are the most commonly cited example of the state's squeezing of agricultural producers in order to raise revenues. Bates (1981) is the seminal work in this literature. See also Krueger (1991).

15. Personal communication, Vernon Ruttan.

16. Difficult to discern partly because available evaluation reports and agency personnel themselves tend to berate everything that happened during these prior periods; also, explanations of good agency performance in particular cases are often not helpful because they identify variables that are idiosyncratic or that represent signs of success rather than its causes (e.g., "charismatic leadership," "coordination"). Looking for antecedents of success in mediocre times is part of my current research agenda.

17. The new varieties were (a) the improved sheep variety, Morada Nova Branca, and (b) improved pastures and forage for beef cattle, goats, and sheep in the semi-arid zone of the state. Though generally positive, the evaluation of this program pointed to the difficulty of getting the universities to do more applied and "relevant" research, with the exception of the Center cited in the text (Sanders *et al.*, 1989 and 1986, Annexes D, E).

18. For a history of this orange-led development of the Tabuleiros Sul region, see Wanderley (1988).

19. See, e.g., Peek (1988) and the evaluation studies cited therein; also Tendler (1982).

20. Two additional factors played a role in this overlapping of elite and lower class rural interests: (a) public good-type investments (particularly roads) were undertaken that benefited all, and local elites often voluntarily contributed financing because of the high value of the consequent reduction in their transport costs and increase in their land values; and (b) better off farmers actually contributed assets because they were offered something by the state that they could not get on their own. (See Tendler, 1993 for further illustrations and discussion of these two additional factors.)

21. Leonard (1991, p. 298) points to a similar overlapping of the interests of elites and of peasant farmers, together with the support of "professionalized civil servants," in explaining certain successful rural development initiatives in Kenya. (I thank Carl Eicher for pointing out this passage to me.) In a study of an agricultural program in Mexico, Fox (1986) identifies a similar and more complex process of the support of

peasant farmer interests by civil servants. In what he calls a "sandwich strategy," reformist technocrats facilitate the formation of "autonomous" peasant groups to take over populist rural development programs from the local elites who have appropriated and managed them in their own interests. Also "sandwiched" into submission in this process are resistant, and usually higher up civil servants.

22. Muda Nordeste (1985) presents some of these demands and their justifications. For a discussion of the larger context of democratization in which these demands became possible, see Falcão Neto (1985), Guimarães Neto

(1988), Lavaredo and Pereira de Sá (1986), Sales (1988), Santos (1988), and Stepan (1988).

23. See Bell, Clark, and Ruttan (1993).

24. Damiani (1993) provides an interesting example of informal contracting of an extension agent (in return for lodging and gasoline) by a farmer association in the agrarian-reform settlement of Santana in the state of Ceará, one of the most successful farmer groups in the state. The relation was built up and ultimately recognized by the extension service at exactly the same time that the extension service was formally resisting the introduction of farmer/user-centered contracting.

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