

RELEVANCE OF UNIVERSITY-BASED RESEARCH TO LOCAL FARMING PROBLEMS: THE CASE OF MAKERERE UNIVERSITY AGRICULTURAL RESEARCH INSTITUTE

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(Received 17 May 1993; accepted 21 January 1994)

ABSTRACT

The contribution of university-based agricultural research to solving local farming problems is a major area of debate in developing countries. A case study of Makerere University Agricultural Research Institute, Kabanyolo, Uganda, was done to ascertain the nature of research done at the Institute and to assess the Institute's impact on farming practices on surrounding areas. Most research programmes were found to cover commodities and problems that had a bearing on farming on the Institute's surroundings and the country at large. However, only a few of the research programmes had yielded technologies that could be applied to the farmers. Moreover, the few farmer-usable technologies available at the Institute were not widely adopted among the farmers studied. Most of the potential adopters were unaware of the existence of such technologies at the Institute. The Institute could increase the utility of its research to Ugandan farmers by conducting more adaptive research, strengthening its links with the agricultural research institutions outside the University, and establishing a formal programme for reaching out to farmers and extension workers.

Key Words: Adoptive research, local farming problems, University research, usable technologies

RÉSUMÉ

La contribution de la recherche agricole universitaire à la résolution des problèmes agricole locaux constitue une préoccupation majeure dans les pays en développement. Une étude de cas à l'Institut de Recherche Agricole de l'Université de Makeré, Kabanyolo en Ouganda a été conduite pour s'assurer de la nature des recherches coonduites à l'Institut et évaluer l'impact de ses pratiques agricoles sur les zones environnantes. La plupart des programmes de recherche couvrent les produits de base et les problèmes qui ont un rapport avec les pratiques agricoles des zones avoisinant l'Institut. Cependant très peu de programmes de recherches ont pu generé des technologies pouvant être transferées aux paysans. Néanmoins le peu de technologies adoptables et disponibles à l'Institut ne sont pas adoptées par les paysans car la plupart des usagers potentiels ignorent leur existence. L'Institut pourrait accroître l'utilité de ses recherches pour les paysans ougandais en conduksant une recherche adaptive, en renforçant ses liens avec les autres institutions de recherche agrkole externes à l'Université et en établissant un programme formel en direction des paysans et des agents de vulgarisation.

Mots Clés: Problèmes locaux de pratique agricole, la recherche à l'Université, technologies appropriées recherche adoptive

INTRODUCTION

Agricultural research conducted by the university-based scientists in developing countries is often described as inapplicable to domestic farming problems. Two common reasons given for this conclusion are that: (a) scientists focus on problems that are unimportant to local farmers and that they engage in research primarily to generate results that are publishable in reputable journals (Busch and Lacy, 1981, 1983; Chambers, 1983, 1989; Compton, 1989) and (b) most of the research that university-based scientists conduct is basic rather than applied (Busch and Lacy, 1981; Ruttan, 1982), and applied research is usually restricted to commodities produced for the market. Commodities important for subsistence are given low priority (Busch and Lacy, 1981; Chambers, 1983; Compton, 1989).

These criticisms are contestable generalizations that need further examination through country-specific empirical studies such as the one upon which this paper is based. In this case, Makerere University Agricultural Research Institute, Kabanyolo (MUARIK) was studied to determine the strengths and limitations of university-based agricultural research in Uganda and to explore ways of making MUARIK more beneficial to farmers in the country.

METHODS

The study followed the design of Ary *et al.* (1990) to describe the nature of MUARIK research programmes and to assess their impact on agricultural practices of surrounding areas. Data were collected in 1992 and involved examination of MUARIK research commodities, goals and results followed by a survey of the agricultural practices of farmers in MUARIK surroundings.

The review involved reading research reports that were available in the relevant departments at Makerere University and interviewing MUARIK scientists to characterize MUARIK research commodities, goals and results. The available research results were then classified as basic, adaptable or recommended, based on how ready for farmer use they were reported to be.

The impact of MUARIK on farming in surrounding areas was assessed through a survey

of two groups of respondents: 57 MUARIK employees involved in personal farming, and 144 farmers from selected villages in MUARIK surroundings. The farmers were selected as follows: four parishes were randomly selected from the 16 parishes in Nangabo and Busukuma subcounties (Tibizenda and Denton, unpublished) and, with the help of local chiefs, a list of farmers with access to at least an acre of farmland was developed for each of the four parishes. Using a table of random numbers, 25% of the farmers in each parish were randomly selected. This selection process resulted in a total sample of 152 farmers, of which 144 farmers responded and 6 did not because they were not at home during the time the interviews were conducted.

Structured schedules were used to interview the respondents about the yield-increasing practices they use on their farms and whether MUARIK was a source of any of these practices. Before being used, the schedules were reviewed for content validity by two agricultural extension experts and field-tested on 15 Namulonge Agricultural Research Institute (NARI) employees and 20 farmers in NARI surroundings to ensure clarity and suitability.

RESULTS

Nature of MUARIK research. Results of the study indicated that MUARIK has been active in research from the late 1960s to the mid 1970s and from the mid 1980s to date. Virtually no research was conducted in MUARIK in the late 1970s and the early 1980s because of shortage of staff and funding caused by the political turmoil in the country during the time. Accordingly, the research programmes described here are those implemented from the late 1960s to the mid 1970s and from the mid 1980s to date.

Commodities/Areas covered. As shown in Table 1, in both time periods more research programmes involved crops than livestock or poultry. Within the crop sector, non-traditional cash crops received more attention than traditional cash crops. The research reports revealed that most MUARIK research commodities were justified in terms of their domestic use or export potential, with particular emphasis on banana, pasture, pineapple,

passion fruit, and Irish potato research (Ministry of Agriculture, Uganda, 1990). In general, research programmes on livestock and poultry covered imported (exotic) animals and bird types. Research on native animals and birds was limited and more recent. In the area of agricultural engineering, several implements for reducing drudgery were designed during the earlier period. Overall, MUARIK research commodities and areas were found to be congruent with national research priorities (Ministry of Planning and Economic Development, Ministry of Agriculture, Uganda, 1992; 1981; Opio-Odongo, 1992).

Goals. MUARIK research goals are illustrated in Table 2. In the early years, the Institute concentrated on germplasm collection and evaluation, and introducing new crop, livestock and poultry types, as well as evaluating their adaptation to Ugandan conditions. In addition to germplasm collection and evaluation, the latter research programmes focussed on agronomy, soil fertility, disease and pest control in crop production, and developing low-cost feeding and management systems for livestock and poultry production. In agricultural engineering, earlier research programmes aimed at designing low-cost farm implements such as small tractors, oxen ploughs, and plants for local manufacturing.

Technologies generated. Few research programmes generated technologies that were ready for farmer use. As illustrated in Table 3, most of the available research results were

adaptable rather than recommended. Two factors appeared to explain why only a few farmer-usable technologies had been generated at the Institute. First, some research programmes had stopped before completion, because either the research scientists involved had left the Institute, or the research funds had been depleted. For example, several designs of low-cost farm equipment had not been field-tested since the mid-1970s due to lack of funds. Second, some research programmes were basic in nature and, therefore, were not expected to produce farmer-usable technologies in the short run.

Other characteristics. Postgraduate training and research were found to be major components of MUARIK's present research programmes. Nine (35%) of the 31 researchers who had on-going research projects at MUARIK were postgraduate students. Several MUARIK research programmes were implemented in collaboration with other research institutions in the country. MUARIK researchers working on banana, maize, and Irish and sweet potato worked in collaboration with researchers from government agricultural research institutes and in some cases, international institutes.

MUARIK outreach effects in surrounding areas. All the 57 MUARIK employees acknowledged having been exposed to various improved farming practices and technologies as a direct result of working at MUARIK. However, because of the shortage of land and capital, most of the employees had not used these practices on

Table 1. MUARIK research by commodity/programme area

| Covered late 1960s to mid 1970s | Covered mid 1980s to date |
|--|--|
| Crops banana, bean, soybean, rice, paw, passion fruit, pineapple, tomatoe, flowers, pasture | banana, coffee, cowpeas, passion fruit, pineapple, tomato, pastures, sweet potato, irish potato, maize, millet. |
| Livestock exotic cattle, pigs, goats | exotic cattle, rabbit |
| Poultry layers, broilers | broilers, layers, indigenous chicken |
| Forestry none | agroforestry |
| Engineering animal traction and cultivation, tractorization, food processing, crop harvesting, hand cultivation | animal traction and cultivation implements; rotary injector planters; meteorological studies; surface irrigation and drainage; solar and biogas generators |

Table 2. MUARIK broad research goals

| Commodity (Area) | Late 1960s to mid 1970s | Mid 1980s to date |
|-------------------------|--|--|
| Crops | <p>Germplasm collection and evaluation;</p> <p>Developmet of agronomic packages</p> | <p>Germplasm collection and evaluation;</p> <p>Development of agronomic packages;</p> <p>Selecting and breeding for disease and pest resistance; farming systems studies and evaluation;</p> |
| Livestock | <p>Exotic cattle introduction and valuation;</p> <p>Evaluation of low cost management regimes and feed rations</p> | <p>Evaluation of low cost, feeds for exotic cattle and poultry, low cost feed making and preservation;</p> <p>Rabbit multiplication and evaluation of low cost rations;</p> |
| Poultry | <p>Exotic egg and meat bird introduction and evaluation;</p> <p>Evaluation of low cost management regimes and feed rations</p> | <p>Development and evaluation of low cost feed rations for exotic eggs and meat birds;</p> <p>Evaluation of feeding and management regimes for producing indigenous chicken on large scale;</p> |
| Soil studies | <p>Determining nutrient requirements of different crops</p> | <p>Assessing soil degradation based on soil use patterns;</p> <p>Developing low cost methods for replenishing soil nutrients;</p> <p>Developing methods for assessing soil productivity potential;</p> |
| Engineering | <p>Developing low cost equipment and techniques for reducing human drudgery</p> | <p>Developing low cost biogas generator;</p> <p>Developing a solar drier;</p> <p>Field tests of ox-universal tool fram and tool bar;</p> <p>Improving hand weeders;</p> |
| Forestry | | <p>Evaluation of agroforestry farming systems.</p> |

Table 3. Technologies available at Makerere University Agricultural Research Institute, Kabanyolo**Recommended for Farmer Use**

Soybean variety K1, mulching of banana plants with elephant grass, hand feed mixer, Landrace, and White Large pigs, pasture forages, irish potato varieties.

Adaptable (to be researched more before recommendation)

Tractor Mark V; Ox-universal tool fram and tool bar; hand powered threshers and winnowers; varieties of passion fruit (hybrids), tomato, and maize; charcoal evaporative cooler, pasture forage production systems, rotary injection planters, ox-weeder and seeder, bicycle metallic and wooden trailers (carts).

their own holdings. On the other hand, most of the 144 respondents who did not work for MUARIK were not aware of the improved technologies available at MUARIK. Fifty per cent had never been at MAURIK, 35% knew MUARIK as passers-by, 10% had never toured MUARIK and 5% had worked for MUARIK in the past.

The survey respondents who named MUARIK as a source of improved farming practices had obtained from MUARIK and used one or more of the following technologies: varieties of passion fruit, tomato and maize, piglets of Landrace and White Large pigs, and artificial insemination services. Farmers who used MUARIK technologies tended to belong to one or more of the following categories: (a) had toured MUARIK, (b) worked or had worked at MUARIK, and (c) knew one or more of MUARIK employees.

Interestingly, apart from the pigs and artificial insemination, the other technologies adopted by the farmers were still being tested and, therefore were not officially recommended for farmer use. In the case of piglets, MUARIK was not able to satisfy the demand for improved piglets. For example, in 1992 MUARIK received 12 applications for piglets from outsiders and seven from its employees, but only one outsider and six employees received piglets.

Table 1 shows that the Institute had received numerous visitors in 1991 and 1992, suggesting that some individuals and groups may be assessing agricultural knowledge at MUARIK through formal visits. Schools visited MUARIK mostly and were from all over the country. The schools toured MUARIK research activities and facilities mainly for teaching purposes. It is possible, however, that some students or their teachers gained some new farming insights from the tours which they might have applied on school farms or on their own home farms.

TABLE 4. MUARIK official visitors (1991 and 1992)^a

| Category of visitor | 1991 | 1992 |
|------------------------|------|------|
| Individuals | 8 | 1 |
| Farmer groups | 3 | 6 |
| Schools | 36 | 41 |
| Extensionists (groups) | 4 | 4 |

^aResearchers, policy makers, donors and international visitors are not included in the Table because they are not relevant to the paper. The data were extracted from MUARIK register for official visitors.

A total of nine individuals paid official visits to the Institute during 1991 and 1992 and their addresses indicated that they were not from MUARIK surroundings. A total of nine farmer groups visited MUARIK in 1991 and 1992. Only one group from Nangabo, the subcounty in which MUARIK is located. A total of eight groups of agricultural extension workers visited MUARIK in 1991 and 1992. Seven of these groups were affiliated to non-governmental organizations (NGOs) and the eighth group comprised government extension workers from Jinja district, about 70 miles from MUARIK. Because of time and financial constraints, no follow-up was done on these individuals and groups. It would be interesting to find out what prompted their visits, and whether such insights had been adopted or extended to farmers.

DISCUSSION AND RECOMMENDATIONS

The findings of this study point to both the strengths and problems of MUARIK research efforts. One of the strengths is that the commodities and problems that MUARIK research embraced were relevant to farming in Uganda. Moreover, most of the MUARIK research programmes were done in

collaboration with government agricultural research institutions or on government solicited funds (Ministry of Planning and Economic Development, 1981; Ministry of Agriculture, Uganda, 1992; Opio-Odongo, 1992). The emphasis put on crop research rather than cattle or poultry research is justifiable, because Ugandan agriculture is predominantly crop production (Ministry of Agriculture, Uganda, 1990). MUARIK orientation towards research related to commercial farming of non-traditional crops is not a weakness either. Commercial production of non-traditional crops has been identified as a viable strategy that Ugandan farmers could use to increase their incomes (Ministry of Agriculture, Uganda, 1990).

The major weakness of MUARIK is that, so far, it has generated only a few technologies that are usable by its target clients. In the past, two factors have undermined the ability of MUARIK to generate farmer-usable technologies. First, the political turmoil and civil strife in the late 1970s and early 1980s which caused staff attrition and loss of research funding. And second, a lack of coordination and focus in some research programmes. While the first factor could not be controlled, the second could. Some of the research programmes implemented at MUARIK were individual efforts and lacked coordination and long-range focus. As a result, if a researcher or research funds ran out, MUARIK could not continue the affected research programme.

The research commodities, areas and goals to be emphasized by MUARIK have recently been specified (Ministry of Agriculture, Uganda, 1992). If MUARIK can secure funds to support these plans, its research will become more focussed and its chances for generating more conclusive, farmer-usable technologies increased. MUARIK has also been developing linkages with other agricultural research institutions in the country (Ministry of Agriculture, Uganda, 1992). These linkages should help to improve the ability of MUARIK to sustain its research programmes to completion by reducing duplication of efforts and encouraging sharing of resources.

Another way in which MUARIK could enhance its ability to generate farmer-usable technologies is to encourage some of its postgraduate students to conduct adaptive research

rather than basic research alone. Part of the student research funds and efforts should be utilized to follow through on previous adaptive studies in order to develop farm level recommendations.

Finally, MUARIK should be concerned about the transfer of its technologies to farmers. The study found out that some of the farmer-usable technologies available at the Institute were not known to the potential adopters in the areas surveyed. The reputation of MUARIK as a public research institution will depend on how widely its research results are seen to improve agricultural productivity in the country. MUARIK needs to be concerned about both technology generation and technology transfer because its technology will be valued more when applied by farmers. At present MUARIK has no formal mechanism to transfer its research results to extension workers or farmers. The technology transfer already taking place is limited, informal and difficult to evaluate; it needs to be formalized and augmented.

The study found that extension workers and farmers from within and outside MUARIK surroundings were visiting the Institute. MUARIK should establish a formal outreach programme to foster, determine and evaluate the transfer of its technologies to these visitors and reach out to other audiences. An outreach programme will become particularly important in future as current programmes yield more technologies and donors become more concerned about the impact of completed programmes. The outreach programme suggested here is not an elaborate, nationwide extension service. Rather, it is a simple but formal programme at MUARIK to help communicate to the extension workers and farmers about the technologies available at the Institute. The programme would use such communication methods as field days, magazines, TV and radio programmes, and bulletins depending on the audiences to be reached and the available resources.

Included under the programme would be selected villages in MUARIK surroundings to serve as a developing laboratory (as at *Collegio Postgraduados* in Mexico) or an outreach centre as used by Indian agricultural universities (UNDP, 1990). This aspect of outreach programme would be similar to what the former Department of

Agricultural Economics and Extension (Makerere University) had proposed to do in the late 1980s but lacked the necessary administrative and financial support for implementation (Semana, A.R., personal communication). The outreach area would help the scientists identify problems that are important to the farmers, and test and refine technologies before releasing them for farmer use. With MUARIK support, the newly established Department of Agriculture Extension Education (Makerere University) could possibly spearhead the establishment and management of the suggested programme. However, to be effective the research scientists would have to be fully involved in its conception and operation.

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