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National Agricultural Research

**Report of an evaluation study
in selected countries**

Joint Study by the
UNITED NATIONS DEVELOPMENT PROGRAMME
and the
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Summary of UNDP/FAO Evaluation Study
on National Agricultural Research 1/

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by A.R. Ayazi, FAO

Introduction

1. The spread of improved appropriate technology is an essential element in the struggle to improve the level of food and nutrition in the developing countries and to raise the income of the rural population. In this respect, agricultural research at the national level supported by regional and international efforts has an important role to play and economic analysis has confirmed the high returns to expenditures on research.
2. Over many years, FAO and UNDP have provided technical support for strengthening national agricultural research. Between 1970-81, this support amounted to US\$ 757 million spread over 790 national projects (excluding Forestry and Fisheries) 2/. FAO's assistance through field projects has taken three forms: (i) the inclusion of a research component in a wider agricultural development project; (ii) the conduct of adaptive research to fill important gaps in countries' agricultural technology base; and (iii) building countries' institutional capacity to plan, manage and implement adaptive research.
3. The findings of the evaluation study are based on the experience of 91 completed and on-going agricultural research projects in 25 developing countries assisted by UNDP and FAO; 75 of these projects were located in 12 countries 3/ where comprehensive studies of agricultural research were undertaken by independent missions or national consultants.

Findings and Conclusions

4. National Research: in the 12 countries reviewed, both governments and assistance agencies have been giving increasing attention to applied agricultural research. Expenditures on research in relation to those on other complementary services (extension, input supply and marketing) were usually in balance. In the absence of such a balance, the expected

1/ UNDP/FAO National Agricultural Research: Report of an Evaluation Study in Selected Countries, Rome, 1984

2/ Annual expenditure by FAO on all types of research projects averaged at about US\$ 42 million during 1980-85 with a further US\$ 7 million per year expended under the Regular Programme on the Organization's own research activities

3/ Algeria, Brazil, Burma, Egypt, Indonesia, Kenya, Nigeria, Pakistan, Peru, Senegal, Tanzania, Thailand.

benefits from public expenditures on agriculture were adversely affected. It was found that about one percent of agricultural GDP and 10-20 percent of the funds committed to agricultural development can be appropriately devoted to research. Over-emphasis on capital investment had however frequently deprived agricultural research of essential recurrent resources. Recurrent expenditures were often devoted almost entirely to personnel costs.

5. The study corroborates the view that a clear research policy is an important prerequisite for a coherent and productive research programme. The implementation of such a policy requires support from policy makers, planners, administrators and users. In the absence of an effective central body with authority over national agricultural research, decisions on resource allocation are less likely to be guided by priorities than by pressures originating from competing institutions. This leads to duplication of effort while diminishing the appropriateness, quantity and quality of research outputs. Frequent changes in the structure and responsibilities of research organizations also reduce research efficiency.

6. The full participation of policy makers, scientists, extensionists and producers in the formulation of research programmes was found to be essential. Research programmes were most effective when based on coherent medium-term research plans which started from a detailed knowledge of both farming problems and socio-economic priorities, including the precise identification of the potential beneficiaries of research results.

7. The most effective research was conducted by autonomous organizations with decentralized management responsibility and working under the Ministry of Agriculture. The contribution of universities and private organizations was generally marginal. Useful results were obtained when a network of research stations pooled resources, with particular stations taking the lead responsibility for research on specific crops or animals and agro-ecological zones. It was important to avoid the fragmentation of research efforts through the creation of too many research stations with insufficient manpower and facilities. In general, research manpower should be concentrated in a few stations. It was generally most efficient to provide centrally research services for documentation, maintenance of equipment, data processing, etc. Documentation services in particular had been neglected.

8. The provision of adequate technical and administrative supporting staff to research stations helped to ensure the most effective use of limited scientific manpower. A career structure for research scientists in which promotion was based on capacity to manage and execute research was highly desirable, as was the provision of competitive conditions of service if scientists were to be retained in active research.

9. The importance of a strong extension service to communicate research results to farmers could not be overstated. Close links between research and extension were facilitated by establishing research/extension liaison units with clear responsibility for combining research results into viable extension packages for transmission to extension workers in a form they could easily put to use.

10. In most of the 12 countries, the emphasis of agricultural research on particular commodities was broadly in line with their relative importance in the economy, but specific research priorities were not clearly spelled out and efforts tended to be dissipated over an excessive number of research topics. The programming of research needed to take account of the size of agricultural GDP as well as resource endowment in terms of land and labour. For countries with small agricultural GDPs, it would be advantageous to concentrate on the local adaptation of available technology for the most important crops and livestock rather than focussing on more demanding research such as plant breeding.

11. Adaptive research on food crops, especially cereals, appeared to have made considerable headway in developing improved varieties and related appropriate technologies; disease resistance had proved to be as important as high-yielding varieties. The provision of genetic material by the International Agricultural Research Centres had played a useful role. However, similar progress has not generally been achieved with respect to legumes, roots and plantains. Research on multiple cropping and inter-cropping also deserved comparatively more attention. Other areas of research on which more stress was required included rainfed agriculture, pre- and post-harvest losses, water use and irrigation, soil fertility, appropriate mechanization, socio-economic research including farm management, research documentation and research/extension liaison.

12. The study revealed that despite the importance of small farmers in agricultural production, it is only recently that substantial research effort has begun to meet their specific needs. The research requirements of marginal areas, where subsistence agriculture is predominant, are also now receiving more emphasis. Partly because of its complexity, agricultural production systems research has been given inadequate attention with the result that farmers, especially small producers, were often reluctant to adopt research recommendations that involved higher risks and which failed to take full account of the various constraints facing them. The uptake of results was usually improved when prior to the dissemination of new technology, the economic benefits and compatibility with farmers' practices were confirmed through on-farm testing.

13. UNDP/FAO Projects had supported critical areas of research, although sometimes one aspect was overemphasized and occasionally research facilities were established without provision for complementary services such as extension. A large volume of research results were produced, covering a range of subjects (plant selection and breeding, agronomy, plant protection, livestock breeding, nutrition and disease, soils and irrigation, farm mechanization and agro-industry). The adoption rate of the research results by farmers was noteworthy when researchers were involved in the training of national extension staff. Uptake was particularly high when recommendations were incorporated into government development programmes.

14. The UNDP/FAO projects reviewed had assisted developing countries to establish or strengthen 40 research institutions, all of which had on-going research programmes at the time of review and 24 of which were continuing independently of UNDP/FAO assistance. Of 33 institution-building projects which had been running for four years or more, 22 had succeeded in building

up the associated institutions into active, on-going research institutes and the great majority of fellowship holders had returned to the research institution.

15. Projects supported by UNDP/FAO were found to be most effective when their immediate objectives were precise and their work plans took a realistic account of the availability of counterpart staff. Research projects for production support were most effective when there was a clear-cut focus on adapting existing technology to local conditions. These positive features, however, were lacking in a number of UNDP/FAO supported projects reviewed for the study. A preparatory phase in projects to verify the relevance of objectives and activities and to define the scope and nature of project inputs and outputs was found to be constructive.

16. A successful institution-building project distinguished clearly between the activities of the project and that of the institution. Such a project gave priority to fellowship training, particularly to higher degree levels, and was of adequate duration to allow for extended on-the-job training. Care was also taken not to burden the institution with excessive research tasks. However, in a number of institution-building projects reviewed for this study, these essential features were lacking and, as a result, deterioration occurred in the work programmes of the institutions once UNDP/FAO assistance was terminated. In a few instances, the UNDP/FAO projects contributed to the development of research facilities in a particular topic beyond the point at which the country could sustain them or had led to a distortion of emphasis in the overall research programme of the country.

17. Expatriate teams of 3-5 experts were found to be most effective and in institution-building projects, experts' capacities as trainers were as important as their research abilities. Single experts of high calibre could fulfil a useful role provided they were integrated into experienced national research teams. The use of junior experts and volunteers in institution-building research projects tended to detract from the training of national scientists. Short-term consultancies by the same individuals were more effective when their inputs could be followed up by experienced national or project teams. The effectiveness of counterpart and national project directors was greatest when they were assigned full time to the project.

18. The lessons gained from the evaluation study and from the experience of the research policy advisory missions organized by FAO indicate that the long-term measures needed for the sustained development of national agricultural research can be briefly summarized as including:

- (i) the formulation of research policies and priorities in conformity with the long-term agricultural development potential of the country;
- (ii) the allocation of between 10-20 percent of annual expenditures on the development of agriculture, fisheries and forestry to research;
- (iii) maintenance of the crucial balance between capital and recurrent expenditure on research;

- (iv) a strong coordinating body to discourage fragmentation in research and minimize the duplication of research activities among agencies, universities and specialized institutions;
- (v) high priority to the research needs of basic food crops with special attention given to the development of appropriate technological packages for small-scale producers and marginal areas, and ensuring that the research results are absorbed at the farm level;
- (vi) adequate allowance in research programmes for on-farm trials and farming systems research, and testing the economic viability and social acceptability of research recommendations;
- (vii) a comprehensive long-term programme for training of national staff at all levels of responsibility in agricultural research;
- (viii) to ensure the relevance and cost-effectiveness of research, a system of monitoring and evaluation for the management of research as well as for assessing its outputs, effects and impact;
- (ix) other essential features of a sound national agricultural research programme are the provision of adequate incentives to research scientists and technicians; close liaison with outside institutions and the provision of adequate facilities for reference material, information gathering and retrieval.