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The agricultural research system of Egypt

Ahmed-SHARKAWY

Professor of Genetics - Faculty of Agriculture - Cairo University

Since 1960, food production in Egypt has failed to keep pace with consumption. A number of factors have contributed to increasing this gap, including:

- 1. a low level of investment in agricultural research;*
- 2. slow growth in agricultural products;*
- 3. rapid population growth and a large increase in per capita food consumption.*

The gap between food production and consumption will continue to widen unless there are substantial changes.

I - Agricultural research institutions

1. Agricultural Research Center (ARC)

As part of the Ministry of Agriculture, ARC is responsible for agricultural research and, since 1983, for certain development activities (seed production, management of state farms, and extension research). It brings together 13 research institutes that are specialized in agricultural economics, agricultural mechanization, animal health, animal production, animal reproduction, cotton, major field crops, horticulture, plant pathology, plant protection, serums and vaccines, soils and water, and sugar.

Research is conducted in 31 experimental stations located all over the country:

13 for major field crops, six for horticulture and 12 for animal research. They are grouped into seven groups: North Coast (Sabahia), New Lands (Nubaria), North Delta (Sakha), Middle Delta (Gemmeiza), South and East Delta (Bahtim), Middle Egypt (Sids) and Upper Egypt (Shandaweel).

The Board of Directors of ARC, chaired by the Ministry of Agriculture, consists of the directors of the 13 institutes and the Director General of ARC.

2. Universities

Egyptian universities are governed by the Ministry of Education and Scientific Research. Eleven of them contain faculties of agriculture and veterinary medicine. The three largest faculties of agriculture are: Cairo-Giza (with of 5,000 students and 540 staff), Alexandria, and Cairo-Ain Shams. Other faculties are located in Assiut, Zagazig, Mansoura, Fayoum and Suez Canal.

Universities conduct basic agricultural research. Some of this research is done by graduate students, many of whom are junior staff at ARC pursuing advanced degrees. A considerable amount of independent research is conducted by faculty members in addition to the teaching programs in which they are engaged. The three oldest and largest faculties of Cairo, Alexandria

and Ain Shams, are considered the most prestigious with the highest quality faculty, teaching programs and facilities. Most but not all universities have at least one small experimental farm for teaching and research (100 - 200 acres). University libraries are still deficient, specially in periodicals.

3. National Research Center (NRC)

The National Research Center was established in 1950 to conduct basic and applied research which would contribute to the national welfare. It is also involved in scientific and technological consulting as well as training and human resource development. Research activities are organized into five programs: industrial technology transfer, food and agriculture, health and environment, energy, and national resources.

The basic administrative unit is the laboratory. There are 52 laboratories grouped into 13 divisions.

NRC is managed by a director with policy guidance provided by a governing board. It employs 400 professionals, 25% of whom hold a Ph.D. degree. The **Agricultural Research Division** is the largest (600 employees including 200 Ph.Ds).

NRC has a laboratory service with an impressive array of instrumentation and trained operators. It performs services such as mineral and food analyses, nematode identification, electron microscopy sections and photography. Moreover, NRC has a training school for instrument repair and maintenance.

In agricultural research, NRC develops programs to help improve the yield of certain crops. One example is the 1981 campaign that dealt with maize production in the Giza Governorate involving 1,360 acres. Its success led to an increase in the area of maize cultivation to 40,000 acres in Middle Egypt. Another example is the campaign dealing with improving tomato production in Middle Egypt that led to an increase of 300% with an average yield of 25 tons per acre.

4. Water Research Center (WRC)

The Water Research Center was established in 1975. It consists of 11 research institutes, a Project for the Water Master Plan, a Department for

Technological Training, and a Department for Research Services.

The Water Master Plan is a UNDP supported project started in 1977. The main goals of the plan are establishing models for routing water flow from the upper Nile and Lake Nasser as well as an agro-economical model for determining the effects of numerous irrigation policies on agriculture production.

Research is carried out on the groundwater of the Nile Valley to determine irrigation equipment needs and to construct models for the Equatorial Lakes.

The **Water Distribution and Irrigation Systems Research Institute** conducts, at the national level, studies on water requirements as well as irrigation methods and rotations that help to raise agricultural production. Moreover, the Institute is currently conducting a multidisciplinary field study of on-farm water management (EWUP).

The **Drainage Research Institute** is conducting research on the effects of recently installed field-drains on crop production. Besides other responsibilities, the Institute has a program on the re-use of drainage water in irrigation. There are about 30 civil and agricultural engineers on the DRI staff, some with the Ph.D. degree.

The **Groundwater Research Institute** conducts studies on the development and management of groundwater reservoirs, compiles and analyses hydrologic data, and studies the protection of groundwater reservoirs from potential contamination.

5. Desert Research Institute

The Desert Research Institute was established in 1934 and officially inaugurated in 1951. It originally belonged to the Ministry of Agriculture and at times to the NRC, but was recently transferred to the Ministry of Land Reclamation. It carries out research in the Sinai Peninsula (winter rainfall 100 mm), the New Valley (a major artesian basin in the Nubian sandstone), the Mediterranean littoral zone and the banks of Lake Nasser.

The Desert Research Institute has seven departments: geology, hydrology, soils, land

reclamation, plant production, plant ecology, and animal production.

The staff consists of 115 researchers, 60 associate researchers and 145 technicians. The majority of the professional staff have Ph.D. degrees, and others are about to finish their degrees. The institute publishes *The Desert Institute Bulletin* twice a year, and has a 100 acre experimental station at Marriut and another one in Sinai.

6. Academy of Scientific Research and Technology (ASRT)

The Academy of Scientific Research and Technology supports research directed toward solving problems of national interest. It also encourages the application of modern technology. There are ten autonomous research organizations included at ASRT. The one that interests us is the National Research Center (see above). The others include the Remote Sensing Center and the Institute of Oceanography and Fisheries.

Many of the activities and programs of the ASRT are formulated by 11 specific councils, such as: Food and Agriculture, Environment, Social Sciences and Demography, Genetic Engineering and Biotechnology. Each council in turn develops goals and objectives for a plan and invites proposals to address specific areas of research intended to meet these goals.

The Food and Agriculture Council's 5-year research plan aims at the following: to maximize the use of land and water resources; to increase major field crops and fruits; implementing a scientific approach in agricultural productions; expanding mechanization, and to raise the rate of local animal production.

II - Financial resources

For the fiscal year 1984, the ARC budget was 37 million Egyptian pounds (28.1 for research, 8.2 for production, and 0.7 million for extension). Previous budgets were 32.3, 29.2 and 21.3 million for the years 1983, 1982 and 1981, respectively. These budgets cannot be considered to be entirely in support of research.

Most institutes also perform some service and/or production function. These generate revenues (10 million £E in 1983) which revert to the Ministry of

Finance. In 1984, the ASRT had requested 47 million £E from the government to support projects developed in response to the 5-year plan. Government funding for ASRT has been substantially below this amount, but the Agricultural Program receives the highest priority.

The budget of the Water Research Centre was 7.1 million £E in 1983.

Projects that are administered by USAID receive foreign technical assistance of around \$50 million per year. These include projects on irrigation management, agricultural mechanization, rice research and major cereals.

The University Linkage Project, jointly administered by the Education Office of USAID and the Senior Council of Universities, provides \$27 million over a 5-year period. Other foreign technical and financial assistance is provided by the World Bank, CIMMYT, IRRI and ICARDA.

III - Coordination of research activities

The ASRT Council on Food and Agriculture has no in-house research body, so it achieves its objectives through staff members at universities and other research institutes. The universities, NRC, ARC and certain ministries are all carrying out agricultural research which is not always coordinated. Moreover, research activities carried out by universities are oriented towards graduate theses. NRC efforts emphasize crop production campaigns and involve recommendations for farm practices which are sometimes different from those developed by ARC. Such divergent views need to be reconciled so that a common set of recommendations can be presented to farmers.

On the other hand, positive coordination of research activities is being achieved by the University Linkage Project. Examples of such coordination are: Biological control of corn borers (Cairo University, Assiut University and University of Maryland), and design and development of agricultural equipment for small farms in Egypt (Cairo University and University of Illinois).

IV - Improving the effectiveness of agricultural research in Egypt

Despite the fact that Egypt has relatively high levels of productivity on existing arable lands, a further increase in agricultural output could be realized by the use of improved production technology.

One of the major factors in improving the effectiveness of agricultural research is to **establish research priorities**. Would it be better to give priority to raising the productivity of existing lands or create new arable land? The Government of Egypt plans to continue its land reclamation efforts. Given this fact, it is important that research be undertaken to provide the knowledge needed to make such efforts as successful and productive as possible. There have been major land reclamation projects undertaken with little or no research information to guide them or to suggest appropriate cropping patterns and management practices for particular conditions.

A second major factor in improving the effectiveness of agricultural research is to **emphasize coordination of research efforts**, with a minimum of duplication and overlap. ARC would be involved in implementation and the

universities, NRC and DRI would supply the scientific personnel. These efforts could be integrated in a national plan of multidisciplinary research programs.

V - Summary and conclusions

Expenditure on agricultural research in Egypt is low. Resources are heavily committed to salaries so that research operating budgets are severely constrained. Financial support for equipment, supplies, maintenance, etc., is extremely deficient.

Massive funding would be required to bring laboratories and experimental farms in all faculties of agriculture up to a satisfactory standard. This would enhance the quality of the graduate programs in agriculture which provides a major source of the personnel for ARC.

Although the size of the staff to carry out a desired level of agricultural research is adequate, supporting sources are extremely low.

Coordination between research centers, universities and other research organizations is needed. The salaries of scientists also need to be upgraded to attract high level personnel and to encourage them to work for the government.