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Management of National Agricultural Research Systems in Selected Arab Countries: An Overview

إدارة نظم البحوث الزراعية الوطنية في بلدان عربية مختارة: نظرة شاملة

الهيئة العربية للبحوث الزراعية
Arab Organization for Agricultural Research

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ادارة نظم البحوث الزراعية الوطنية في بلدان عربية مختارة : ملخص اجمالي

July 1994

Arab Organization for Agricultural Development (AOAD)
International Service for National Agricultural Research (ISNAR)
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المنظمة العربية للتنمية الزراعية
الخدمة الدولية للبحوث الزراعية الوطنية
برنامج الأمم المتحدة الانمائي

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Acronyms

AFESD	Arab Fund for Economic and Social Development
AgGDP	agricultural gross domestic product
AOAD	Arab Organization for Agricultural Development
ARA	Agricultural Research Authority
AREA	Agricultural Research and Extension Authority
ARC	Agricultural Research Corporation
ATMS	Agricultural Technology Management System
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo
DANIDA	Danish International Development Agency
DFRV	Direction de la Formulation de la Recherche et de la Vulgarisation
DRE	Department of Research and Extension
DSC	Department Scientific Committee
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDA	International Development Association of the World Bank
IDRC	International Development Research Centre of Canada
IFAD	International Fund for Agricultural Development
INPV	Institut National de la Protection des Végétaux
INRAA	Institut National de la Recherche Agronomique d'Algérie
INRF	Institut National de la Recherche Forestière
INSA	Institut National de la Santé Animale
ISNAR	International Service for National Agricultural Research
ITAF	Institut Technique de l'Arboriculture Fruitière
ITCMI	Institut Technique des Cultures Maraîchères et Industrielles
ITDAS	Institut Technique de Développement de l'Agriculture Saharienne
ITEBO	Institut Technique des Elevages Bovin et Ovin
ITGC	Institut Technique des Grandes Cultures
ITPE	Institut Technique des Petits Elevages
NARS	national agricultural research systems
RETC	Research and Extension Technical Committee
SARMAC	Strengthening Agricultural Research Management in the Arab Countries
SBAAR	State Board for Applied Agricultural Research
SBAR	State Board for Agricultural Research
SSC	SBAR Scientific Committee
UN	United Nations
UNDP	United Nations Development Programme
WANA	West Asia and North Africa

I. SARMAC Project and Field Study Methodology

1. Introduction

The Arab countries in the region of West Asia and North Africa (WANA) are geographically widespread and demographically and economically diverse. But they can be classified geographically in four subregions:

- ***North Africa:*** Algeria, Libya, Mauritania, Morocco, and Tunisia;
- ***Nile Valley and East Africa:*** Djibouti, Egypt, Somalia, and Sudan;
- ***West Asia-Fertile Crescent:*** Iraq, Jordan, Lebanon, Palestine, and Syria;
- ***West Asia-Arabian Peninsula:*** Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen.

Populations in 1990 ranged from a low of 0.3–2 million for Bahrain, Djibouti, Kuwait, Mauritania, Oman, Qatar, and the United Arab Emirates; 2–10 million for Jordan, Lebanon, Libya, Somalia, and Tunisia; 10–20 million for Iraq, Saudi Arabia, Syria, and Yemen, to 20–52 million for Algeria, Egypt, Morocco, and Sudan (table 1).

Arable land in the region varies from about 1000 to 5000 hectares for Bahrain, Djibouti, Kuwait, and Qatar; 39,000 to 48,000 hectares for Oman and the United Arab Emirates; 200,000 to 400,000 hectares for Jordan, Lebanon, and Mauritania; and more than one million hectares for Algeria, Egypt, Iraq, Libya, Morocco, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, and Yemen (table 1).

Rainfed areas account for about three-quarters of the total cropping area, with substantial variation in rainfall between years as well as among areas. Agricultural production in the region is constrained by land and water resources, and the limits of agricultural land have been reached in most of the countries. Increases in production can only come about through increases in yield, cropping intensity, and irrigated area, which implies higher use of improved technologies, more intensive use of land (particularly reduced fallow), and an increase in harvested irrigated areas.

Improving agricultural production is a high priority for development in the region; however, the importance of agriculture in the economy varies from one group of countries to another. In high-income, oil-exporting countries, agricultural development aims at promoting diversification and increasing self-sufficiency; in the middle- and low-income countries, agriculture is the primary source of food, export earnings, employment, and inputs to textile and agro-industries.

In general, the demand for food, stimulated by growth in both population and income, has exceeded domestic food production in the region. It is estimated to be growing at an annual rate of about six percent, compared to an annual increase of about three percent in total food production. Since about 1970, many countries have been meeting their food deficits by increasing imports of cereals and other foodstuffs at unsustainable rates.

Thus, the region's food security has been affected by the persistent decline in food self-sufficiency during the last two decades. The severe instability of agricultural production, especially from rainfed farming, and the reliance on world markets to fill the gap in the region's food and feed deficits call for a major effort to improve the systems that manage the supply of food and feed. The deficits are particularly important in cereals (feed and foodstuffs), vegetable oils, sugar, and livestock products.

To achieve rapid, significant agricultural development in the region, the countries must acquire and use improved technologies that can not only result in an increase in land, animal, and labor production over time, but which can also maintain sustainable agriculture and the efficient use of traditional resources and new inputs. This increase in production can be achieved only through strong research and technology-transfer systems; appropriate production policies and plans; rational pricing, credit, and export/import policies; and an adequate infrastructure to ensure efficient distribution of inputs and products.

Table 1:, Regional Profile

Country	Total Population 1990 (1000)	Agricultural Population 1990 (%)	Arable Land and Permanent Crops, 1990 (1000 ha)	Agricultural Production Index 1979-81=100 1992	Agricultural per Capita Production Index 1979-81=100 1992	Agricultural Products	
						Imports 1991 ($1000,,000)	Export 1991 ($1000,,000)
North Africa							
Algeria	24,960	23.8	7,644	176.9	126.0	2,620.9	34.4
Libya	4,545	13.7	2,155	153.9	96.2	1,203.5	8.1
Mauritania	2,024	64.4	205	112.4	81.4	159.5	41.3
Morocco	25,061	36.3	9,327	137.7	101.4	840.5	669.9
Tunisia	8,180	24.3	4,576	159.7	121.4	460.1	481.5
Subtotal	*64,770*	*32.5*	*23,907*	*148.1*	*105.3*	*5,284.5*	*1,235.2*
Nile Valley & East Africa							
Djibouti	409	19.3	1	n.a.	n.a.	98.0	9.0
Egypt	52,426	40.5	2,607	144.1	107.4	2,669.8	367.3
Somalia	7,497	71.1	1,039	41.5	30.2	76.1	39.2
Sudan	25,203	60.2	12,900	132.4	92.9	318.6	444.2
Subtotal	*85,,535*	*47.8*	*16,547*	*106.0*	*76.8*	*3,162.5*	*859.7*

Table 1: Regional Profile (continued)

Country	Total Population 1990 (1000)	Agricultural Population 1990 (%)	Arable Land and Permanent Crops 1990 (1000 ha)	Agricultural Production Index 1979-81=100 1992	Agricultural per Capita Production Index 1979-81=100 1992	Agricultural Products	
						Imports 1991 ($1,000,000)	Exports 1991 ($1,000,000)
Fertile Crescent							
Iraq	18,920	20.5	5,450	112.5	75.9	731.2	21.5
Jordan	3,288	5.8	400	197.1	121.7	746.4	201.0
Lebanon	2,701	8.8	301	185.0	174.2	624.9	140.1
Syria	12,530	24.1	5,626	136.2	89.6	687.9	599.7
Palestine (West Bank)	721	5.8	207	n.a	n.a	n.a	n.a
Palestine (Gaza strip)	592	6.4	24	n.a	n.a	28.7	70.2
Subtotal	*38,752*	*11.9*	*12,008*	*157.7*	*115.4*	*2,819.1*	*1,032.5*
Arabian Peninsula							
Bahrain	516	1.7	2	n.a	n.a	280.0	4.7
Kuwait	2,039	4.4	4	n.a	n.a	284.9	12.6
Oman	1,502	40.0	61	n.a	n.a	588.5	93.5
Qatar	368	10.6	5	n.a	n.a	287.7	8.2
Saudi Arabia	14,134	39.0	2,365	588.5	341.3	4,010.6	474.8
United Arab Emirates	1,589	2.5	39	n.a	n.a	1,747.7	436.3
Yemen	11,687	56.1	1,609			732.5	56.2
Subtotal	*31,835*	*22.0*	*4,085*			*7,931.9*	*1,086.3*
TOTAL FOR ARAB COUNTRIES	220,892	25.2	56,778	175.2	120.0	19,226.5	4,283.9

Source: FAO AGROSTAT Files

Each country will have to decide what is the most efficient way of ensuring food security through increased self-sufficiency by increasing domestic production, increased trade, or reliance on food aid where freely available. Obviously, the decision will affect the research system's goals in terms of the commodities, regions, and classes of farmers that it targets. However, increased food self-sufficiency will involve research, technology-transfer, and input costs. At the same time, it may affect the balance of resources devoted to irrigated versus rainfed areas, the particular crops that are emphasized, and the employment that will be generated. The research system should be in a position to respond to these needs.

2. The Need for Strengthening Agricultural Research Management

There are vast differences between countries with respect to the size of research resources, the degree to which the socioeconomic policy framework is conducive to research and development, and the commitment of government to research and development. However, most countries in the region have introduced some form of agricultural arrangement to promote research and gear it towards agricultural development policies. At this stage, there is a tendency in small systems to include research as a separate department (or as sections within departments) within the ministry of agriculture, while large systems tend to have a semi-autonomous national institution or a number of institutions involved in agricultural research.

National agricultural research systems (NARS) play a central role in the process of technology generation and transfer. They are essential for identifying technology problems and for developing and adapting appropriate technologies. Experience has shown that without a strong and effective national research system, advances in agricultural research are unlikely. Whether primarily generators of technology or adapters, for a NARS to be strong requires a supportive policy environment, an organization compatible with the designated objectives and functions of research, adequate resources to carry out research activities, and a coherent set of management processes that allow the system to produce in a continuous and cost-effective way.

A major constraint in the development of strong and effective NARS in Arab countries is management. In many Arab countries, there are few top-quality research managers and often little consciousness of the main issues involved in good research management. Experience with several countries in the region has revealed several management issues that are of particular importance, such as the need for clear goals for the NARS to develop its research policies, for long-term commitment of resources, for appropriate structure, organization, and linkages, for developing research resources, and for improving the process of managing research activities.

The Arab Organization for Agricultural Development AOAD and the International Service for National Agricultural Research ISNAR have jointly developed a project proposal entitled "Strengthening Agricultural Research Management in the Arab Countries (SARMAC)." The SARMAC project proposal was endorsed by the Ministerial Council of AOAD in 1987.

3. Objective

The SARMAC objective is to assist NARS in Arab countries in their efforts to generate and adapt agricultural technologies through the development of stronger research policy, organization, and management capacities.

4. Approach

The project strategy has two parts:

- **operational change** within the NARS;
- the **training** of research managers.

Operational change can provide staff with an environment in which they can be good managers. And staff can be the moving force in bringing about such a change. The SARMAC project has identified areas in which operational change within NARS might be appropriate and has also provided training opportunities in research management. In addition, linkages between NARS in the region could be strengthened.

The SARMAC operation has two interrelated parts:

- studies of the organization and management of NARS in four selected Arab countries;
- four national agricultural research management seminars and a regional seminar to discuss the findings, conclusions, and recommendations of the project.

5. Outputs

The output or products planned under SARMAC are four country studies, four national seminars, and one regional seminar.

The country studies

In-depth collaborative reviews of the agricultural research management systems in four selected Arab countries were carried out under the project. Each study was done by a national team with backstopping from AOAD and ISNAR. Three review reports on NARS in the Sudan, Iraq, and Yemen were published and distributed.

The national seminars

The national seminars were organized to present and discuss the NARS reviews. The seminars, which were essential parts of the studies, allowed for active involvement of a broader base of NARS managers and policymakers in the selected countries prior to final publication of the reports. Four national seminars were held, one each in Sudan, Iraq, Yemen, and Algeria. The seminar reports were included as part of the country review reports.

The regional seminar

The regional seminar examined the methodology, conclusions, and recommendations from the four country studies. Through this process, NARS managers from countries that did not participate directly in one of the four studies had the opportunity to consider the collected recommendations and conclusions in the context of their own research systems.

The overall objectives of the regional seminar were

- to develop an awareness and understanding among participants of particular issues in agricultural research management on the basis of the conclusions and recommendations of the studies;
- to provide a forum for research managers to interact with each other to exchange experiences.

6. SARMAC Implementation and Funding

The project has been implemented in two phases:

Phase I: Development of a methodology for the field studies, with testing in the Sudan, and a national seminar to present and discuss findings. This phase was funded by AOAD and ISNAR. The Arab Fund for Economic and Social Development (AFESD) provided partial funding for the training component.

Phase II: Preparation of three country studies (Iraq, Yemen, and Algeria) and three national seminars, one for each country, to discuss study findings and recommendations, as well as a regional seminar to discuss common issues and lessons learned from the four country studies. The second phase was funded by AOAD and ISNAR. Partial financial support was provided by the United Nations Development Programme (UNDP).

7. Field Study Methodology

In the first phase of the project, the methodology for the field study was developed by adapting and integrating the guidelines for ISNAR reviews and evaluations of NARS with the agricultural technology management system (ATMS) methodology. Thus, the field study methodology presented a number of tools that the country study teams could use in collecting, analyzing, and interpreting the data. The methodology was tested in the Sudan in late 1987. It contained the ATMS concept, analytical stages, and a checklist of key questions and information on research management, structure, organization, and policies to be collected from research institutions.

8. Implementing a Country Study

Country studies were implemented following by a seven-stage process:

a. Preparation:
   - identification of the local study team, representing disciplinary and organizational dimensions;
   - study preparation.

b. Training of the local study team through a two- to four-day preparatory workshop in which an ISNAR/AOAD preparation team introduced and discussed the field study methodology, with the following objectives:
   - adapting the methodology to the country situation, with the local study team;
   - improving methods for collecting the data;
   - developing a schedule for implementing the study, holding the national seminar, and finalizing the draft report.

c. Implementation of the study by the local team: collecting, analyzing, and interpreting the data to produce the first draft report.

d. Finalizing the first draft report at AOAD and ISNAR.

e. Presenting the local study team's draft report to the ministry of agriculture in the country.

f. Holding a two-day national seminar to present and discuss the final draft report, with the participation of research policymakers and leaders in the country, along with AOAD and ISNAR representatives.

g. Finalizing, publishing, and distributing the country report.

The schedules achieved for implementing these stages in the four countries are shown in table 2.

Table 2: Schedules Achieved in the Implementation of the Four Country Studies

Stage/Country	Sudan	Iraq	Yemen	Algeria
Training of theLocal Study Team	June 1987	July 1989	August 1990	October 1990
Preparing 1st Draft Report	March 1988	May 1991	January 1992	August 1993
Finalizing 1st Draft Report	April 1988	July 1991	May 1992	November 1993
National Seminar	August 1988	January 1992	September 1992	February 1994
Finalizing and Distributing Report	September 1988	March 1992	February 1993	May 1994

9. Issues of Importance during Implementation

Local study team formation

The composition of the local study teams showed that the selection process was carefully considered by AOAD/ISNAR. Each team was *multidisciplinary* in nature: it included biophysical scientist(s) with long experience in the operation of agricultural research institutions and universities in the country and agricultural economist(s) with long experience in the economics of the agricultural sector. Moreover, each local study team was *multiorganizational*, representing the main research institutions responsible for research program formulation and implementation in the country, the ministry of agriculture (as a major agricultural policy-making body in the country), and universities (as educational and research institutions). The local study team was supported by AOAD and ISNAR. Thus, the composition of the local team insured complementarity in the outcome of the country study.

Data collection and finalization of the first draft report

The *Sudanese* study team was able to collect data at the level of the agricultural sector, institution, and researcher over a couple of months. However, the *Iraqi* study team was unable to collect information at the level of either the researcher or the research institution; therefore, the Iraqi study team was requested to prepare a desk report using the checklist mentioned earlier of key information to be collected from the research institution.

During the period from September 1990 to November 1991, the *Yemeni* study team collected data on the role of agriculture in the economy, structure, and function of ATMS, research institutions, and researchers. A draft report was prepared in early 1992.

The *Algerian* team collected data on the researchers and research institutions of the Ministry of Agriculture. The team drafted the report in August 1993.

All reports drafted by national teams were sent to ISNAR for further analysis and revision and for production of the draft reports, which where presented to the concerned ministries of agriculture in each of the four countries. The ministries called for national seminars to discuss the project's findings and recommendations. Proceedings of each national seminar were incorporated in the NARS review report. The final review reports of the four participating NARS were edited, published, and distributed.

The ATMS and checklist of questions for reviewing NARS

The ATMS, as a concept and as a practical approach to diagnosing constraints, is considered useful because it takes a systems approach, emphasizes the broader environment within which the NARS functions (including the policy environment), and leads to an in-depth study of NARS human and financial resources as well as the particular linkages and functions that the NARS performs. However, the ATMS is not enough to carry out a diagnostic review of NARS without information on research plans, programs, physical resources, organization and structure, information, and monitoring and evaluation, which can be collected with the checklist of questions.

While ATMS is a useful tool for understanding the impact of the broader environment on NARS, it should be recognized as a complement to other methods designed to study NARS organization and management, and not a separate focus of attention.

This overview synthesis summarizes the findings and discusses the common issues in the four NARS reviews of Sudan, Iraq, Yemen, and Algeria. It also contains a summary of the proceedings of the regional seminar on agricultural research management held in Beirut, Lebanon, June 14–15, 1994.

II. The Agricultural Sector

Agriculture plays a very important role in the life and economy of most Arab countries, including Sudan, Iraq, Yemen, and Algeria, by producing food, feed, fiber, and other products and by providing the capital needed for agriculture and for other sectors in the economy. As mentioned earlier, however, the demand for agricultural products has increased sharply during the last three decades as a result of relatively high population growth rates, an increasing tendency for the rural population to migrate to urban areas, and changing food consumption habits.

Agriculture contributes 6% to 8% of the gross domestic product (GDP) of Algeria, 12% to 12% of Iraq's GDP, 18% to 27% of Yemen's, and 36% of Sudan's.

There are certain agricultural systems that are common among the four selected countries of the study, as well as other Arab countries. But in addition, each country has its own specific agricultural systems, which are determined by rainfall, the availability of water for irrigation, altitude, temperature, and traditional farming patterns.

The main commodity groups produced are cereals, vegetables, fruits, industrial crops, and livestock. The staple cereals are sorghum and millet for Sudan and Yemen and wheat and barley for Iraq and Algeria.

While Yemen and Sudan are self-sufficient in sorghum and millet, Iraq's and Algeria's self-sufficiency in wheat and barley have been sharply reduced during the last two decades. Three countries, i.e., Algeria, Iraq, and Yemen, like other Arab countries, are increasingly importing cereals, edible oils, and sugar, but Sudan is self-sufficient in these products and sometimes exports edible oils and sugar. Feed for livestock, including poultry, is another item considered a top priority for increasing self-sufficiency by the four countries—and by all Arab countries.

Governments in the region are increasingly committing themselves to improving both the technological structure and economic conditions of the agricultural sector. Development and diffusion of new technologies for the agricultural sector have received top priority in the governments' development plans. This concern with technological solutions to the agricultural problems of how to increase productivity stems, in part, from the concern for self-sufficiency in food production. It is also based on the desire to make farming a profitable business in order to discourage the rural population from migrating to urban areas, as well as being based on the quest for more intensive methods of land use. In addition, they have introduced some policies to improve agricultural production, which include subsidized production inputs, financial loans, and attractive pricing policies.

1. Natural Resource Base

Climate

While Sudan lies entirely in the tropics, Yemen is situated in the northern stretches of the tropics, with mean annual temperatures ranging from less than 15°C in the central highland to 30°C in the coastal plains. Iraq's climate is continental and subtropical, with rainfall in winter similar to that of the Mediterranean. The climate in Algeria ranges from the Mediterranean type in the north to tropical in the south.

Water resources

Sudan's water resources are obtained from the Nile River system, underground catchment areas, and rainfall. Sudan's share of the Nile River's annual discharge is 18.5 billion m^3. The underground water supply is estimated at 4900 billion m^3, and annual rainfall ranges from 25 mm in the north to 1600 mm in the extreme south. In Yemen, water is scarce. The major sources are rainfall and underground aquifers. Rainfall is highly

erratic in terms of time, quantity, and location. It varies from less than 50 mm in the coastal lowland plains and eastern desert zone to more than 1200 mm in the western mountainous highlands.

Algeria's sources of water are rainfall, underground aquifers, and springs. Rainfall ranges from less than 50 mm in the south to about 1000 mm in the north. Iraq's sources, however, are surface water from the Tigris and Euphrates Rivers, rainfall, and underground aquifers. Annual rainfall is highly erratic, ranging from less than 100 mm in the south to about 1000 mm in the north.

Land resources

The cultivable area in Sudan is estimated at about 80 million hectares, of which about 12 million hectares is cultivated in good rainy years. The irrigated area is about 2 million hectares. In Yemen, the cultivated area is about 1.5 million hectares, of which about 0.4 million hectares are irrigated. The cultivated area in Iraq, however, is about 5.5 million hectares, of which about 2.5 million hectares are under irrigation. The total rainfed cultivated area in Algeria is about 7.3 million hectares and the irrigated area is 0.2 million hectares.

Vegetation and agroecological zones

Soil, temperature, rainfall, land use, topography, and cultivation are the main determinants of the geographic distribution of vegetation. Agroecological zones in the four countries could be classified as follows:

Sudan: Alluvial plains, desert, semi-desert, montane, low-rainfall woodland savannah, high-rainfall woodland savannah, and marshland;

Iraq: Alpine plants, forests, river banks, steppe, desert, and marshland;

Yemen: Tropical Tihama (coastal plain), southern uplands, highlands, midland slopes, eastern and northeastern desert plateau, coastal and foothills, middle montane highland, and high montane;

Algeria: Mediterranean coastal plan, montane plains, mountane, steppe, and desert.

2. Human Resource Base

The total population and total agricultural population for Arab countries in 1990 is shown in table 1. In *Sudan* the total population was about 25 million in 1990, of which 60% lived in rural areas. More than 8 million of the economically active population were engaged in agricultural activities. The population in *Iraq* was about 19 million in 1990, of which 21% were involved in agriculture. The *Yemeni* agricultural population formed about 56% of a total population of about 11.7 million. Of the *Algerian* population of about 25 million, the agricultural population formed about 24%.

3. Agricultural Production Systems

In each of the four countries, the agricultural sector is comprised of various production systems, which vary in their contribution to the agricultural GDP (AgGDP). These systems are interrelated and complimentary.

Sudan

Irrigated production systems include the public production corporations of about 1.3 million hectares in the Gezira and Managil, Rahad and New Halfa schemes; pump schemes of about 0.6 million hectares; flood-irrigated system of about 0.4 million hectares; and sugar plantations of about 80 thousand hectares. The rainfed production systems include traditional shifting cultivation, with areas ranging from about 3-8 million hectares with annual rainfall exceeding 250 mm; traditional montane cultivation; mechanized farming, ranging from about 3 million hectares in moderate rainy seasons to about 6 million hectares in good rainy seasons.

In the **public production corporations,** an intensive cropping system accommodates cotton, sorghum, wheat, groundnuts, and vegetables. Intensification and diversification of farming systems has resulted in several production constraints, such as weeds, pests, diseases, water shortages, loss of soil fertility, post-harvest losses, and labor shortages, which have led to reduced production.

Pump scheme production systems vary between the areas north and south of Khartoum. Grain legumes, vegetables, fruits, and aromatic crops are becoming increasingly important, while wheat and sorghum have less importance in the north. As a result of the privatization of the Blue and White Nile schemes, the challenge for farmers is to produce profitable crops.

Flood irrigation systems cover riverain and semi-irrigated areas. While riverain lands are privately owned by farmers, the semi-irrigated Gash and Tokar Deltas are managed by public agricultural corporations and farmed by tenants. In the riverain areas, farmers grow annual crops, e.g., vegetables, fodder, grain legumes, and cereals, following the flood from the river system. The semi-irrigated crops include sorghum, millet, vegetables, and cotton.

Rainfed, traditional shifting cultivation is practiced in most regions of the country. Cropped land is successively planted for four to five seasons if rainfall is adequate. When the soil fertility in this land declines, farmers shift to nearby land that has been under natural vegetation for the same period. Crops include sorghum, millet, maize, sesame, groundnuts, roselle, and watermelon. In addition, vegetables, maize, cassava, and yams are grown in the south.

Montane cultivation is practiced in the hilly areas when rainfall is sufficient. At the mountain foot and in the valleys where seasonal floods occur, the flooded areas are cultivated with annual crops such as sorghum, maize, millet, tobacco, and vegetables.

In **mechanized farming** the major crops include sorghum, sesame, sunflowers, and cotton.

Livestock comprises large and small ruminants and poultry. The number of ruminants has been estimated for 1991-92 at 21.5 million cattle, 21.3 million sheep, 15.6 million goats, and 2.8 million camels. Livestock production is managed under nomadic, transhumant, and sedentary systems integrated with crop production and urban backyard farming. Communal ranges in the nomadic system provide grazing for cattle, sheep, and camels.

Fishery land and stock assessment indicated that the potential finfish catch could reach 100,000 tons/year. The potential marine catch has been estimated at 10,000 tons/year.

Iraq

The area suitable for agriculture has been estimated at about 12 million hectares, of which only 5.75 million hectares are actually in use. According to the availability of water, two main farming systems can be identified: **irrigated and rainfed farming systems.** In the northern region where both rainfed and irrigated agricultural are practiced, about 375,000 hectares are under irrigation, and the remaining cultivated area is rainfed. In the middle and southern parts of the country, agriculture depends on irrigation.

The choices of plant crops to grow are based on the demand for these crops, their production capacity, and their importance in the irrigated and rainfed systems in the country. Based on this, there are seven crop production groups: cereals for food and feed, dry food legumes, oilseed and industrial crops, vegetables, tree fruits, forests, and range and forage crops. Cereals occupy about 80% of the total cultivated area, with wheat and barley being grown on 94% of the cereal area, rice on 3%, maize on 2%, and others taking up 1% of the cultivated area. About three-quarters of the wheat production comes from rainfed areas, with the remaining from irrigated areas. For barley, about 60% is produced in rainfed and 40% in irrigated areas. Most vegetables are grown under irrigation, as are most oilseed and industrial crops (e.g., sesame, cotton, sugar beets,

sugarcane, and tobacco). Fruit trees in the middle and south of the country are irrigated. In the north, they are both irrigated and rainfed. Date palms, citrus trees, and grapes are the three main fruit crops in the country.

The **livestock production systems** vary from traditional low-input/low-output seminomadic types to the extreme of highly capital-intensive, modern farms. The former case is more typical for sheep and goats. Poultry production, however, tends toward the higher end of the scale, with importated technology, equipment, raw materials, eggs and one-day-old chicks from the most highly productive hybrid lines. Cattle and buffalo production is between sheep and poultry in intensity. The numbers of sheep and goats fluctuate as a result of range conditions and rainfall. In 1990 there were 9.6 million sheep and 1.5 million goats, with about 1.7 million head of cattle. Poultry numbers reached 75 million chickens in 1990.

The catch from both in-land and marine **fisheries** was 16,000 and 5000 tons, respectively.

Yemen

Farming in Yemen could be divided into **rainfed, permanent irrigated, and spate- (flood-) irrigated farming systems.** Rainfed farming systems can be classified into two subgroups: high-rainfall farming systems (with rainfall of more than 500 mm per annum) and low-rainfall farming systems (with less than 500 mm of rainfall). The rainfed farming systems are predominantly in the central highlands and southern and western uplands of the country. The low-rainfall areas are characterized by erratic rainfall and periodic droughts.

The sources of water for permanent irrigated farming are wells and springs. While wells and springs are more common in the highlands, wells and floods (spates) are common in the coastal areas. The permanent irrigated area forms about 12% of the total cultivated area and about 59% of the total permanent and flood-irrigated areas.

Crop groups grown in the country include food and feed cereals, dry food legumes, industrial crops, vegetables, fruit and stimulant tree crops, forest trees, and ranges and forages. About 85% of the land cultivated for crops is for field crops and about 85% of this is planted to cereals. About 77% ofthe land planted to cereals is occupied by sorghum and millet. Wheat occupies 11% of the cereal area and about 19% of total cereal production. The three main industrial crops are cotton sesame, and tobacco. Vegetables are grown in small irrigated plots in all areas. The main fruit crops are grapes (at about 43% of fruit production), bananas, papayas, and dates.

Livestock husbandry in the country is practiced largely by traditional farmers. Thus, crop production and livestock are interdependent. Sheep and goats graze on range during the wet season and are fed crop residues and by-products during the dry season. Cattle, however, are kept in the house and fed sorghum and millet stalks, as well as leaves and alfalfa. In some locations, cattle graze with sheep and goats on crop residues on fallow land. The total number of sheep, goats, and cattle is about 3.7 million sheep, 3.2 million goats, and 1.1 million head of cattle. Poultry production systems in the country vary from the traditional low-input/low-output types, like those for other farm animals, to highly capital-intensive enterprises that are separate from crop production. The number of birds increased by about ninefold over the last two decades: from 3 million birds in 1969-71 to 27 million birds in 1988-90.

Fish and crustaceans are harvested by private fishermen, small-scale cooperatives, public industry, and through joint ventures with foreign vessels. The annual marine fishery catch during the eighties ranged from about 66,000 to 71,000 tons.

Algeria

Rainfed agriculture is the predominant farming system in the country. Cultivated land comprises about 7.5. million hectares and is distributed across six major zones:

- Zone A, which receives more then 600 mm annual rainfall, is intensively cultivated with citrus and early vegetables. Wells for irrigation are also used in this zone.
- Zones B and C, which cover about 66% of the cultivated land and include the plateau area, receive fluctuating annual rainfall from 350 mm to 600 mm. While cropping in Zone B is predominantly wheat-fallow rotation, cropping in Zone C is barley-fallow rotation.
- Zone D receives from 250 mm to 350 mm of uncertain annual rainfall. Cereal cropping is irregular and is used mainly for grazing.
- Zone M receives more than 350 mm annual rainfall. It has steep slopes and is subject, therefore, to severe erosion.
- Zone I is **irrigated** from wells, springs, and oasis water. It is about 0.3 million hectares in area.

Annual crops occupy 93% of the total crop area. Fruit trees occupy the remaining 7%. Annual crops include cereals (which occupy about one-third of the annual crop area), dry legumes, forages, industrial crops, and vegetables. The main cereals are wheat and barley. Fruit crops include grapes (about one-fifth of the total fruit area), olives, date palms, and others.

Livestock production systems vary from traditional low-input/low-output types to highly capital-intensive, modern farms. In 1992, there were 18.6 million sheep. The total number of goats and cattle, however, was 1.4 million goats and 2.5 million head of cattle. Poultry production has increased during the last two decades; by 1992, the country had 76 million birds.

Marine **fisheries** catches were about 70,000 tons in 1986.

4. Agricultural Policies

In the last two decades agricultural development has been a major concern of the governments in the four countries (Sudan, Iraq, Yemen, and Algeria). However, the development of agriculture in Algeria was limited during the 1970s and early 1980s by the country's economic development strategy, which concentrated on industrialization at the expense of agriculture. As a result, agriculture's share of the GDP declined from about 13% in the 1970s to 6% to 8% in the 1980s.

In general, the growth of agriculture in the four countries has not sufficiently kept pace with the growing demand and the production of staple foods has stagnated. As per capita incomes have risen and the population has increased, the food gap has widened significantly.

In an attempt to improve agricultural performance, governments in the four countries have, however, increasingly liberalized the sector and this has given a new impetus to growth. Subsequently, the demand for technologies for the production systems is changing to match the demand in local as well as external markets. The challenge to farmers is to produce profitable commodities — research has to be strengthened to confront this challenge to develop the required technologies for dynamic farming systems.

In all four countries, the economies are moving to more open service and commercial agricultural economies, an effort that has been channelled into five-year development plans for the agricultural sector. The main strategies and objectives of these plans address various aspects of agriculture in development and focus on upgrading agricultural efficiency through improved performance and productivity, as well as increasing the contribution of agriculture to national development.

Food consumption patterns in the four countries indicate that about two-thirds of calories consumed per capita per day come from cereals—wheat, sorghum, and rice. The high population growth rate, changing food preferences involving the consumption of more wheat, and the improvement of per capita income have

all increased the demand for basic staple foods: cereals, vegetable oils, sugar, and animal products. This, coupled with the low rate of growth in sorghum, wheat, and rice production, has meant that food self-sufficiency has declined during the last two decades, especially for wheat, vegetable oils, and animal products. The import bill for agricultural products has increased for Iraq, Yemen, and Algeria. Sudan, however, is self-sufficient in sorghum, sugar, and vegetable oils, and Sudan's self-sufficiency in wheat has improved during the last few years.

III. The Agricultural Technology Management System (ATMS)

1. Technology Generation and Transfer Policies

The governments in the four countries are subsidizing the production of principal crops by providing cash loans and producer subsidies for production inputs, i e., seeds, fertilizers, and pesticides. The governments also provide river water for irrigation, produce and distribute animal vaccines, and control insect pests, diseases, and weeds of national economic importance.

Production of improved seeds, mainly breeder seeds, is the responsibility of the main research institutions in each country (Sudan's Agricultural Research Corporation, Iraq's State Board for Agricultural Research, Yemen's Agricultural Research and Extension Authority, and Algeria's Instituts Techniques and Institut National de la Recherche Agronomique d'Algérie).

Policies on transport, storage, and processing are set by concerned governments and implemented by the public and private sectors. Development plans have dealt with these issues by allocating financial resources for development projects under the agricultural, industrial, transport and communication sectors. Private-sector investment in transport, storage, and processing of agricultural products is encouraged and controlled through government regulations and policies.

Governments in the four countries are supporting research and extension by continuously improving their resource bases. Considerable emphasis has been placed on improving the human and physical resource base for research, as well as for extension. There is a tendency for research organizations to undergo frequent reorganization, with the objective of making research more responsive to the needs of the agricultural sector. This reorganization and other aspects of research policy, organization, and management will be dealt with in the following pages.

2. Analysis of ATMS Structure and Function

The project methodology called for the identification of main institutions and groups involved in the ATMS in each of the four countries. Particular attention was given to their role in affecting the structure and performance of agriculture in the country, in affecting the critical functions the ATMS is expected to perform, and in the mechanisms by which the system carries out these functions. However, two of the studies, Sudan and Yemen, were also able to collect, analyze, and interpret data on the institutions and groups involved in the finance, policies, services, generation, transfer, and use of technology. The roles of these institutions/groups were defined through 13 functions that were identified for ATMS to perform or, at least, influence. These functions include formulating national macroeconomic policy, allocating resources among sectors, setting agricultural sector goals, allocating resources within the agricultural sector, developing human resources for the agricultural sector, setting the agricultural research strategy, developing human resources for agricultural research and technology transfer, generating political support for agricultural research and technology transfer, generating technology, transferring technology, providing support services to agricultural technology adaptation, insuring marketing and the use of the product, and evaluating the impact of technology development efforts. For each institution group participating in the ATMS, the responsibility and mechanism for participation in each of the 13 functions was described. This type of analysis helped to explain the policy context of technology generation, which plays a critical role in shaping the structure of agricultural production and the efficient use of natural resources, along with the context for technology generation and transfer.

IV. Agricultural Research

1. Historical Background

Sudan

Agricultural research in the Sudan dates back to the turn of the century. Formal agricultural research began in the northern province in 1902 and near Khartoum in 1903 to explore the possibilities of growing cotton under irrigation. This was followed shortly by similar work at Rumbek and Wau for rain-grown cotton. The Wellcome Tropical Research Laboratories were established in Khartoum in 1903 with an emphasis on medical research, but they also conducted chemical and entomological research related to agriculture. Botanical and agricultural research started in 1904 in Shambat Research Station. Pilot schemes and experiments by the Sudan Plantation Syndicate showed that cotton could be grown successfully on a commercial scale in the Gezira area. This prompted the establishment of the Gezira Research Station in 1918. In 1931, the Agricultural Research Service was formed as an independent body, and in 1935 it was absorbed into the Department of Agriculture and Forests. In 1944, the new Agricultural Research Division was established.

After independence in 1956, agricultural research expanded rapidly to encompass activities in different crops and ecological zones in the country. To ensure the technical and productive efficiency of research activities, the Agricultural Research Division was made semi-autonomous by the Act of 1967 and became the Agricultural Research Corporation (ARC). It was entrusted with almost all of the applied research in field crops. In 1977 the act was amended to amalgamate the research functions of food processing, forestry, fisheries and marine life, and wildlife as centers in ARC. At present, ARC research activities are carried out in its network of four research centers, 18 stations, six substations, and 22 testing sites.

Iraq

In the 1920s the Ministry of Economics and Transport included a Directorate General for Agriculture in its organizational structure. The technical department of this directorate conducted many research activities, especially on diagnosis and control of plant pests and animal diseases. The first experiment stations at Abu Ghraib and Neinevah and the central veterinary laboratory were established by this directorate.

The Directorate General of Agricultural Research and Projects was established in 1952 with its headquarters at Abu Ghraib. In 1968, it was reorganized and 12 provincial research centers were established throughout the country. In the 1970s, research activities were distributed between several services and research directorates general of the Ministry of Agriculture and Agrarian Reform. The Agriculture and Water Research Center was established within the Council of Scientific Research. This council and its centers were liquidated in 1989.

In 1979, the State Board for Applied Agricultural Research (SBAAR) was established within the Ministry of Agriculture and Agrarian Reform by merging several research departments at Abu Ghraib, the place where the first Directorate of Agricultural Research and Projects was located. In 1987 and 1990 SBAAR was reorganized and expanded its mandate to cover soil and water research, and its title became "State Board for Agricultural Research (SBAR)." At present SBAR has seven research departments, a central station, seven headquarters-outreach stations, and three provincial research departments with 10 stations and three substations. SBAR is mandated with responsibility for most fields of agricultural research, with the exception of animal health and fisheries.

Yemen

Agricultural research in Yemen goes back to the 1950s, when El-Kod Research Centre was established in South Yemen. After the independence of South Yemen in 1967, agricultural research went through two phases.

- Phase I (during the 1970s): Three UNDP/FAO-supported projects were implemented to strengthen research and technology transfer. These projects assisted in establishing the Seiyun Research Centre, developing a nationally coordinated research program, and establishing the Department of Research and Extension (DRE).
- Phase II (during the 1980s): Two UNDP/FAO- and IDA/FAO-supported projects were implemented to strengthen technology transfer, to reorganize El-Kod and Seiyun Research Centers, and to coordinate research.

Agricultural research was introduced in North Yemen in 1970 when UNDP/FAO initiated three agricultural production projects. However, 1973 is considered the beginning of organizing agricultural research in North Yemen, with the start of UNDP/FAO's Agricultural Research Station and Training Project. Major efforts to develop agricultural research in the North could be categorized by three phases:

- Phase I: The UNDP/FAO Agricultural Research Station and Training Project, Taiz and Ibb (1973-1978), which laid the foundation for the agricultural research organization.
- Phase II: The UNDP/IDA/FAO Agricultural Research Station Project (1979-1982) was implemented to provide specialists and DRE volunteers and to purchase equipment.
- Phase III: The IFAD/Italy/IDA/FAO Agricultural Authority Project (1983-1988) was implemented to assist the newly formed Agricultural Research Authority (ARA) in managing and organizing agricultural research and to train the scientific cadre.

The unification of North and South Yemen into one country in 1990 has led to the merging of the DRE in Aden, the General Directorate of Extension and Training in Sana'a, and the ARA in Dhamar into one semi-autonomous institution, the Agricultural Research and Extension Authority (AREA), with its headquarters in Dhamar. At present, AREA has three research departments at its headquarters, three research centers, five regional research stations, five research stations, and one research subcenter.

Algeria

After its creation in 1966, the Institut National de la Recherche Agronomique d'Algérie (INRAA) was responsible for all agricultural research activities. By 1970 it had four national centers for agronomy, zootechnology, forestry, and rural and economic sociology and 21 research stations in different agroecological zones. Between the mid-1970s and mid-1980s, the government established 10 new institutes, which inherited most of INRAA's staff, facilities, and stations. These include five commodity institutes (for field crops, industrial crops, fruits and grapes, sheep and goats, and poultry), three national disciplinary institutes (for plant protection, animal health, and soil, irrigation and drainage), and two production-system institutes (for desert agriculture and forestry).

By 1989, INRAA had been mandated to carry out fundamental research, to coordinate national applied agricultural research, and to coordinate training and technical assistance related to agricultural research.

In 1993, INRAA was reorganized and was given a leading role in developing agricultural research policies, carrying out research, and coordinating research and technical assistance.

2. Structure, Organization, and Linkages

Organization and Structure

The structure and organization of a national agricultural research system critically influence the efficiency and effectiveness of research. They shape the way the system operates as well as its capacity to diagnose

problems; assess world knowledge of improved technologies; mobilize human, physical, and financial resources to conduct research; and perform other assigned functions to achieve the desired objectives.

Despite recent efforts to improve the performance of agricultural research in the countries studied under the project, agricultural research is facing difficulties in coordination within and among research institutions. While there is a tendency to see structural change as the solution to problems of research efficiency and effectiveness, there is often a failure to understand how complicated organizational change can be. There is also a failure to recognize the usefulness of improved management tools in achieving objectives that may be obtained through better approaches to strategic planning and program formulation and implementation, rather than through frequent restructuring.

Structural changes in agricultural research in Iraq and Algeria were more frequent than in Sudan and Yemen.

At present, there is one main agricultural research institution in three of the four countries: ARC in Sudan, SBAR in Iraq, and AREA in Yemen. However, in Algeria there are INRAA and 10 technical institutes that carry out research under the Ministry of Agriculture.

ARC and AREA are semi-autonomous institutions, each governed by a board (chaired by the Minister of Agriculture for AREA and by an external leading and experienced person appointed by the Minister of Agriculture for ARC). However, in Iraq and Algeria, SBAAR, INRAA, and the technical institutes are under the direct administrative control of the Ministry of Agriculture.

The membership of ARC and AREA's boards is made up mostly of outsiders, except for the director general of each institution, who is an ex officio member of the board. This type of membership allows for the inclusion of government agencies (such as the extension services, planning, finance, and the public production sector) and interested groups (such as producers, academics, and private businesspersons). The main tasks of the board are to develop research policies, strengthen research programs to serve development, set management guidelines for managing the research institutions, and approve annual programs and budgets. While the headquarters of ARC and AREA are far from the countries' capitals, SBAR and INRAA headquarters are located in the capitals. The headquarters in each of the main research institutions in the four countries have central research departments. However, in Sudan, ARC has no central research departments; they are located within Gezira Research Station and the research centers.

While the headquarters of SBAAR and INRAA and the technical institutes each has its central experimental farm, ARC's central farm is in the Gezira Research Station and AREA's is in the Central Highland Regional Research Station.

The station and center network of the main research institutions in the four countries are given below:

Sudan

ARC	
National Level:	**Regional Level:**
headquarters	17 stations
4 research centers (Food, Forestry, Fisheries, and Wildlife)	6 substations
	22 testing sites

Iraq

SBAR	
National Level:	**Provincial Level:**
headquarters	3 departments
7 central research departments	16 stations
1 central research farm	3 substations
7 outreach stations	

Yemen

AREA	
National Level: headquarters 3 central research departments	**Regional Level:** 3 research centers 5 regional stations 5 stations 1 subcenter

Algeria

1. INRAA	
National Level: headquarters 3 central research subdirectorates 2 central research departments 1 central research center	**Regional Level:** 5 stations 2 laboratories

2. National and Technical Institutes	
National Level: headquarters of ITGC, ITCMI, ITAF, ITEBO, ITPE, INRF, INPV, INSA, ITDAS 1 research department in each of the technical institutes 1 studies and programming department in each of the technical institutes	**Regional Level:** ITGC: 9 stations and 1 laboratory ITCMI: 10 stations ITAF: 10 stations ITEBO: 8 stations and 1 laboratory ITPE: 4 stations INRF: 10 stations and 9 testing sites INPV: 10 stations and 1 laboratory INSA: 6 laboratories

In Algeria, and within the Ministry of Agriculture, there is the "Direction de la Formulation de la Recherche et de la Vulgarisation (DFRV)," which finances agricultural research in the Ministry of Agriculture and is responsible for developing research policies to link research with development.

Linkages

Organizing research linkages is one of the basic duties of research institutions. They communicate with a wide range of research partners within and among research institutions both within and outside the country, as well as with their major clients in the country: policymakers and technology-using and -transfer systems. The characteristics of these linkages depend on the type of linkage and whether it is with partners or with clients.

In addition to the various characteristics, channels, and types of linkages, partners in the linkage process generally vary greatly in their competence and commitment to collaboration. Therefore, the linkages vary from country to country and range from simple to quite complex. For linkages to work well, there must be shared objectives, resources, and pressure from research managers and policymakers. Linkages of importance have been identified in the four studies: linkages with service institutions in the ministry of agriculture (especially extension), farmers and farmers' associations, public production schemes, bilateral and multilateral donors and with sources of knowledge, such as university research, other NARS institutions, and regional and international organizations. All of the main research institutions have made important gains in developing formal and informal mechanisms to improve linkages, and over the years, all have developed linkages within and outside the country. However, it was clear in all four studies that mechanisms to make linkages must be improved and resources must be allocated to this purpose.

Linkages within the country: Linkages within the country cover technology development, technology transfer, finance, services, and training.

Collaborative research activities have been identified within the main research institutions and between research institutions, including university research. It is found wherever noncore financial resources are available to support its operation. Collaborative adaptive research is carried out jointly with externally funded research-and-development projects, public production enterprises, commercial companies, and nongovernmental organizations. This kind of research is more common in Sudan and Yemen than in Iraq and Algeria.

Technology-transfer linkages exist mainly to implement on-farm trials for verifying, evaluating, and disseminating improved technologies. These trials are carried out when resources are available.

Research institutions in the four countries provide technical services to various governmental and nongovernmental institutions and to producers. These services take the form of consultancy studies, joint task forces, and laboratory analyses.

Research institute staff assist universities in teaching, developing curricula, and supervising postgraduate students. They also train farmers, extensionists and others.

Linkages at the regional and international levels: Research institutions have a wide network of linkages with other national agricultural research systems, with regional and international organizations, and with many bilateral and multilateral development agencies. These linkages cover the following:

a. regional research networks, where the main institutions in the four countries are members of intercountry regional research networks, e.g., the Nile Valley Regional Program (Sudan, Egypt, Ethiopia), development projects for sorghum, millet, and oilseeds (Sudan, Egypt, Syria, Yemen, Somalia), the Mashreq Project for improving marginal lands (Iraq, Syria, Jordan), the Water Management Program (Maghreb and Mashreq countries), etc.;
b. technical assistance linkages, where the main research institutions receive technical assistance from various regional and international organizations, e.g., ICARDA, ICRISAT, CIMMYT, etc., in the form of joint research activities, training, and research inputs, such as germplasm and technical backstopping;
c. financial assistance linkages, where the main research institutions receive financial support through loans and donations to improve the resource base and to implement research activities. For example, ARC and AREA have received support from the Netherlands, the World Bank, IDA, IDRC, DANIDA, IFAD, UNDP, and FAO.

3. Research Resource Management

The management of human, physical (materials), and financial resources is one of the most important jobs of research managers. Managing these resources well is vital to maintaining the productivity of the agricultural research system and, hence, to ensuring continuity of support from policymakers. The resource management challenge in agricultural research is particularly clear with regard to human resources since most national agricultural research systems spend more than 60% of recurrent budgets on salaries. However, scientists in the four countries have identified financial resources as one of the most serious limitations to research, followed by physical and human resources. Financial resources were identified as being necessary to support researchers and their families and to provide suitable living conditions, operating supplies and materials, equipment and tools, office and laboratory facilities, and access to scientific literature, among other things.

The resource management challenge in agricultural research in the four countries, as well as in other Arab countries, is particularly clear with regard to human, physical, and financial resources.

Human Resources

During the last two decades, the main research institutions in the four countries have been able to build a well-trained and dedicated scientific staff.

Sudan: Although at present there are about 220 active ARC scientists (most of them hold a PhD degree), an appreciable number of scientists have left ARC for one reason or another.

Of the total research staff, 10% are females. Eighty percent of the female scientists are located at the research centers, with more than 50% at the Food Research Center.

The Gezira Research Station serves almost 50% of the irrigated area in the country. It is one of the oldest research stations and hosts ARC headquarters. It has received more attention than the other stations, and about 20% of the total ARC researchers are located there. The Food Research Center has attracted external support, which enables it to build up its scientific cadre of about 17% of the total number of ARC scientists.

Recent changes in ARC's conditions of service have made recruitment, promotion, salaries, and allowances comparable to those of the academic staff at universities in the country.

During the 1980s, recruitment and training were limited because of a shortage of funds, and ARC needs were left unsatisfied. As a result of this, and in response to urgent country needs, ARC has been forced to spread its available research scientists thinly over the network of old and new research stations.

In-service training of scientists increased in the 1980s through collaborative research networks and bilateral and multilateral technical assistance. For postgraduate training, the faculties of agriculture in the country train only for MSc degrees. PhD degrees must be obtained abroad.

Iraq: SBAR and the university system (faculties of agriculture and veterinary medicine) have about 1200 scientists, about half with a PhD and the remaining with an MSc degree. In 1989, SBAR had a professional staff of 682, of which 70 were PhD holders, 141 had an MSc degree, and 471 had a BSc. They were assisted by 384 technicians. About a quarter of the SBAR technical staff was posted at the three provincial departments and their stations, while the other three-quarters were posted at the SBAR headquarters and its outreach stations.

Scientists at SBAR with a BSc degree are classified as agricultural engineers. Those with MSc and PhD degrees are classified as researchers and senior researchers. The salaries of technical staff at SBAR are similar to salaries in other sectors of the civil service.

In-service training of SBAR staff increased during the last decade, both in-country and abroad. The faculties of agriculture trained most of the MSc- and a some of the PhD-level scientists at SBAR.

Yemen: In 1989, AREA had 207 professional staff (23 with a PhD, 67 with an MSc, 83 with a BSc, and 34 expatriates mainly associated with externally funded projects). About half of the national research staff held a PhD or an MSc, and about two-thirds of these were at El-Kod and Seiyun Research Centers. However, staffing of AREA in 1992 included 235 university graduate staff (27 with a PhD, 82 with an MSc, and 126 with a BSc degree). AREA professional staff were assisted by 167 technical staff.

During the period 1980 to 1989, the total number of scientists at AREA with a PhD or an MSc degree increased tenfold.

Salaries of technical staff at AREA were comparable with those of academic staff of the same qualifications at universities in the country, and they are above salary scales in the civil service.

While the two faculties of agriculture in the country provide supplies of trained scientists at the BSc level, postgraduate training for national scientists is provided through universities abroad.

Algeria: In 1992, there were 260 professional research staff at INRAA and the technical and national institutes of the Ministry of Agriculture (INRAA, 37; INRF, 37; INSA, 19; ITCMI, 40; ITEBO, 43; and ITGC, 84). The higher agricultural education institutions had 184 academic staff.

The professional research staff consisted of 38 with postgraduate degrees, 61 with an Ingénieurs d'Etat degree, and about 160 with an Ingénieurs d'Application degree. About one-fifth of the total research staff are female researchers.

Physical Resources

The quality of research output is strongly influenced by the consistency and quality of physical resources. The physical resources available to agricultural research in the countries have increased during the last two decades. Research stations have increased in number to cover almost all the provinces and agroecological regions in each of the four countries. The station network has been reorganized several times in Iraq and a few times in Algeria; in Sudan and Yemen the number of stations in the station network has increased. (The number of stations and centers in each of the four countries, was mentioned earlier in this report.)

In most stations, land for field trials is available. In some cases, there is also land for seed multiplication.

In general, buildings are adequate in size, space, and design in the headquarters of each of the main research institutions in each country. While these central headquarters are well equipped, the outreach stations are inadequately equipped in terms of field and laboratory facilities.

Research support includes chemical analysis laboratories; statistics, data processing, and socioeconomic service units; a centralized agricultural library and documentation center; a maintenance service for scientific instruments; and seed banks. In general, research institutions in the four countries lack adequate central support services for researchers and the public--there is need to strengthen this kind of service to improve research support.

Financial Resources

Expenditures on agricultural research in the four countries were mainly public funds. Agricultural research institutions receive funds from annual and development budgets; however, they also receive donor funds through technical-assistance development projects or through collaborative intercountry research networks partially funded by donors.

Total annual recurrent expenditures on agricultural research in each of the four countries did not exceed 0.6% of AgGDP.

Data on budget allocations for agricultural research in Yemen showed that an overall average of 21% was put into capital investment, 66% went to salaries and related charges, and 13% evered operational costs. In many national agricultural research systems, the salary costs are between 60% to 70% of the total annual budget, sometimes even 80% or more in exceptional cases, while direct operational costs (including operational and experimental inputs) vary between 15% to 35% of the total budget. The remaining 5% to 15% is for overhead (indirect operational costs). These ratios are adequate if the budget level is high enough to pay good salaries to the research staff (at 50% to 60% of the total budget) and still provide sufficient operational funds for using equipment efficiently, conducting reliable on-station and on-farm experiments and studies, and ensuring the required mobility of staff.

4. Research Policies and Plans

Efficient planning helps researchers and research managers maintain the quality of the research program and its relevance to the institution's mandate and clients. The research institution is part of the government system that provides its financial resources; therefore, program planning in the institution must be consistent with the goals and planning procedures of the government.

Development of the agricultural sector has been a concern of the governments in the four countries, as well as in other Arab countries, and hence agriculture has been allocated a substantial share of the development budget.

The principal objectives of the research system are derived from the agricultural development goals of government policies. These goals can be grouped in the following way:

a. improving the growth or efficiency of the agricultural sector (increasing the average level of net social benefits to all citizens);
b. improving equity distribution (improving the well-being of particular groups);
c. improving security (reducing year-to-year income fluctuations and increasing self-sufficiency or self-reliance);
d. preserving natural resources (improving the natural environment).

In response to these goals, the planning of research programs at the main research institutions in the four countries tends to cover most crops already grown in the country or about to be introduced, as well as the country's natural resources. SBAR, AREA, and INRAA have developed their five-year research plans. The implementation of these plans has been faced by many problems, mainly from communication problems in coordinating research activities, shortages of trained human resources and frequent turnover of researchers, and inadequate financial, physical, and human resources to implement research activities.

Annual and five-year planning of research activities has been institutionalized at the main research institutions in the four countries (ARC, SBAR, AREA, and INRAA).

At ARC, the national coordination system was introduced in the late 1970s. In this system, commodity and disciplinary national coordinators were selected from among ARC's senior scientists to assist ARC management in developing, implementing, monitoring, and reviewing annual research activities. However, this was not done satisfactorily because of a lack of allocated financial resources and a lack of authority delegated to national coordinators.

In the early 1980s ARC established a collaborative research program on faba beans through the Nile Valley Research Project, which was later extended to cover lentils, chickpeas, and wheat. The experience gathered from this project on planning and programming research has been adapted to cover other crops. Thus, since 1990 there have been annual coordinating meetings for scientists by crop, discipline, and specialized research centers to review the previous season's research program and to plan the program for coming seasons. Participants in each of the meetings include relevant researchers, national coordinators, directors of centers and stations, and representatives of stakeholders.

At SBAR, each of the central and provincial research departments has a department scientific committee (DSC). After researchers have formulated a research project proposal, it is presented by the project director to the DSC for discussion and approval. Approved project proposals are then submitted to the SBAR Scientific Committee (SSC) for further discussion and approval. The project proposals approved by the SSC, which in aggregation form the annual and five-year plans, are submitted to the Ministry of Agriculture and to the Ministry of Planning for final approval and allocation of funds on an annual and a five-year basis.

At AREA, planning is a decentralized system at the regional level as well as at headquarters. Each regional station or center sets up its own priorities for research activities for the coming seasons, within the guidelines

developed by AREA's board. There is a research and extension technical committee (RETC) in each regional station or center responsible for discussing and approving the research proposals developed by scientists.

At AREA headquarters, commodity programs that have been approved at the level of the regional station or center are combined and integrated and submitted to the AREA board for final approval.

At INRAA, the five-year plan for 1990-1994 is structured around four domains: plants, animals, natural resources, and socioeconomics. Each domain has its own dimensions, in each dimension there are research themes, and annual research projects are developed within the framework of research themes. The five-year plan contains 13 lines and 38 themes. The annual research program for 1990 had 70 research projects. The study team identified 58 research themes in 21 lines of research at technical institutes and at INRAA.

The five-year research plans have helped research institutions improve political support. They have obtained better allocation of financial resources and have been able to build up the physical and human resources needed to implement research programs. But they have faced many problems implementing research programs, mainly because of shortages of resources and a lack of efficient management capacity. The process of planning is a set of approaches that, when followed, make research institutions more efficient and effective.

The Planning Process

Two sets of five documents should be prepared through the research program planning process at the national and/or institutional levels. The first set consists of **three** documents to be prepared for government planning and finance. The second set consists of **two** detailed programming documents to be prepared as operational plans for the research to be implemented – in order for it to achieve its goals and objectives.

The preparation of the **1st set**, the three government documents, is guided by two major government documents. These documents help the research institution prepare its planning documents for financing its research activities. They include

a. the national economic development plan, which establishes the guidelines by which research institutions prepare and present **research policy and strategies and five-year research plans** to the government as part of the agricultural development strategy and five-year plan, respectively;
b. government procedures for resource allocation, which guide research institutions in preparing and presenting their **annual programs and budgets** for government support.

The **2nd set** includes the preparation of

a. **a long- and short-term research program plan,** the preparation of which is guided by the research policy and strategies, world knowledge, and technical possibilities. The program plan contains identified and prioritized long- and short-term research projects;
b. a detailed **annual research program** (an action plan containing experiment and study proposals), the preparation of which is guided by long- and short-term programs, world knowledge of current results, and client circumstances.

The long- and short-term programs will guide the preparation of the five-year plan for research to be submitted as part of the agricultural development plan, and the annual research program will guide the preparation of the annual budget.

Research institutions in the four countries lack any sort of national agricultural research policy and strategy to guide the preparation of a detailed long- and short-term research program covering research projects on which five-year and annual plans are based. Thus, the four country studies called for formulation of national agricultural research policies and strategies, along with long- and short-term research programs.

5. Research Program Management

Implementing the Research Program

Research program management covers many issues concerning implementation, resource mobilization, monitoring and evaluation of on-going research activities and research results, and managing information, among other things.

Research activities have grown during the last decade to cover more commodity and noncommodity areas. Subsequently, the resources needed to implement these growing programs were either increased tremendously during the 1980s or spread thinly among newly established centers and stations.

Technology development for crop improvement consists of on-station research (including laboratory and field experiments and studies managed by researchers) and on-farm research (including researcher-managed trials, farmer-researcher–managed trials, demonstration plots, and pilot production plots).

Efforts to carry out on-station and on-farm trials vary from crop to crop and depend mainly on the availability of resources. Crops such as wheat, barley, sorghum, millet, grain legumes, and oilseeds, which are receiving external support, have benefitted from the implementation of on-farm as well as on-station research trials. External support has helped concentrate research efforts by introducing and encouraging a multidisciplinary approach and by providing leadership stability, funding, and flexibility in obtaining supplies to ensure that the technology developed is high quality, relevant, and acceptable to stakeholders.

Research is increasingly becoming involved in various mechanisms of technology transfer. Two main approaches for technology transfer could be identified in the studies:

a. in the vertical approach, where technologies are developed mainly through on-station research, are approved by the respective technical committees, and recommendations are sent to farmers through various channels;
b. in the horizontal approach, which is a participatory approach, on-station results are verified and economically evaluated under farming conditions. Packages are developed and demonstrated in larger fields to convince farmers of the validity of the research recommendations. Farmers, extensionists, and researchers all participate in this approach. It is a horizontal approach and is generally practiced where funds and external technical interfaces are available.

Monitoring and Evaluation

Monitoring and evaluation are most effective when integrated into the planning and implementation of agricultural research. Research institutions in the four countries have developed various mechanisms to monitor and evaluate their research programs. These mechanisms include periodic progress reporting, national commodity/noncommodity coordination in monitoring and evaluation, and management procedures.

The system of monitoring and evaluation needs to be improved in all research institutions to make research more efficient and effective. An improved system would make research activities more relevant to development and of higher quality. It should be an integrated part of the research planning and implementation process and should include periodic recording, analysis, reporting, and storage of data to be used for research management purposes.

Information Management

The information needs of the research institutions can be classified in the following categories:

- scientific and technical information, which is dealt with by libraries and documentation centers to assist scientists in their research activities;
- administrative information, which covers file keeping, correspondence, human resources, etc.;
- financial information;

- technical information on research activities to assist researchers in monitoring, evaluating, and executing their research;
- research program management.

Lack of information on research program management can be a major impediment to effective management of research programs. Research managers need to know exactly what experiments their researchers are doing, with what facilities, and at what cost. Without this type of information, research managers can not perform, or improve, essential functions such as planning, programming, coordinating, monitoring, and evaluating agricultural research activities.

Modern information technology could be used successfully to improve the availability of technical information on research activities and research program management to researchers, research managers, and decision makers.

V. Conclusions and Recommendations

The national agricultural research systems in Algeria, Iraq, Sudan, and Yemen have central roles in both developing and transferring the technology required to meet the agricultural development challenge. They are essential for identifying technology problems and for developing and adapting appropriate technologies.

The utility of agricultural technology is determined by agroecological, socioeconomic, and policy conditions; thus, agricultural technology is in general highly location specific. It needs to be adapted to local conditions and ultimately used by a large number of farmers. This underscores the leadership role that the national agricultural research system inevitably must assume in generating and adapting technology. The agricultural research leaders in the country must be in a position to reflect upon and influence agricultural development policies, to define national agricultural research needs and priorities, to evaluate both their own findings and those of the global research community under local conditions, and to contribute to the technology-transfer process through formal and informal linkages with extension and producers.

Whether primarily a technology generator or technology adaptor, the national agricultural research system must be strong and effective if it is to contribute significantly to agricultural development in the country. However, no matter how well trained, researchers cannot attain their fullest potential without institutional support.

A strong and effective agricultural research system requires
- a coherent research policy and program designed to meet agricultural development objectives;
- an organization and structure compatible with the designated objectives and functions of research;
- the ability to communicate effectively with its clients, partners, and policymakers;
- resources (human, financial, and physical) adequate to conducting research activities;
- a coherent set of management processes, which allow the system to mobilize and use its resources in a continuous and effective way.

Based on these fundamental requirements for an effective and efficient research system, four review studies were conducted by national study teams in Sudan, Iraq, Yemen, and Algeria with backstopping from AOAD and ISNAR and partial financial support from AFESD and UNDP. The purpose was to review and propose improvements in the areas of agricultural research policies and plans, organization and structure, resource management, and program management. Thus, a set of recommendations in these areas was proposed in each of the four country studies. The recommendations that are common to all four studies are listed below:

1. Research policy and plans:

To improve the planning of agricultural research, a proposal for each country study was developed. It included principles for the formulation and implementation of
- a research policy and strategy;
- a research program, including long- and short-term program plans (projects) and an annual program (experiment/study proposals).

2. Research organization, structure, and linkages

A centralized research policy body was proposed to determine policy and strategy, secure political support for agricultural research, participate in the formulation of agricultural development policy, secure financial and human resources, approve five-year program and budget plans, and organize the implementation of strategy, program, and budget plans.

In each main research institution, it was proposed that an internal committee be established to develop guidelines for research proposals, approve annual programs and budgets, coordinate research activities,

organize implementation of research programs, improve data on current research, improve the system for reporting research activities, and guide the management of the institution.

Efforts should be made to continuously improve linkages within research institutions and between the research institutions and extension for joint planning and follow-up of research trials, especially on-farm trials, for identification of farmers' problems and for joint on-farm validation and verification trials.

Collaboration between research institutions and the country's universities should be improved through identification of efficient mechanisms to enhance research coordination.

Linkages with sources of knowledge should be strengthened, especially between main research institutions and regional and international research. Research institutions should develop collaborative programs for training, germplasm exchange, information exchange, and execution of joint research activities with relevant regional and international organizations. Research institutions should strengthen their participation in relevant intercountry, regional, and international research networks.

3. Research resource management

Planning and development of human resources should be organized so that research institutions can review future program needs in terms of the available skills of researchers and research support staff. Staffing, career, and training plans should be developed to assist research institutions in maintaining dedicated and efficient staff. Research institutions should improve human resource management by developing job descriptions and evaluation and performance systems and by improving the conditions of service of research staff.

To maintain and sustain a good physical resource base, research institutions should develop strategies for physical resources to tackle issues such as the regionalization of the research station network to serve agroecological and production systems more efficiently; the maintenance and repair of buildings, land, and equipment; and the record keeping of supplies and purchases.

Centralized research support services should be established at the headquarters of the main research institution in each country. This would include improving the germplasm bank, developing a central agricultural library and documentation center for the country, establishing a central workshop for the maintenance of scientific equipment, and establishing central laboratories to serve researchers and the public, e.g., (a) for routine chemical analysis of food, feed, pesticides, and fertilizers, (b) for experimental design, statistics, and data processing, and (c) for soil testing and classification.

Financial resources should be enough to conduct on-station and on-farm trials and to purchase the supplies needed for research.

4. Research program management

National commodity and noncommodity research programs should dictate the research planning process to facilitate multidisciplinary research within institutions and between these institutions and the universities.

Research institutions should increase support for on-farm trials to test and validate technologies and conduct joint trials with extension.

An improved monitoring and evaluation system should be developed to monitor and evaluate research activities to make them more relevant and of higher quality to serve the development process. This system should be an integral part of the research planning and implementation process and should include efficient periodic recording, analysis, reporting, and storage of data to be used for research management purposes.

Improved information technology systems should be developed to improve the information systems for research program management and management of technical information on research activities.

VI. Summary of Proceedings of the Regional Seminar on Management of Agricultural Research in Arab Countries Beirut, Lebanon, June 14–15, 1994

The Arab Organization for Agricultural Development (AOAD) and International Service for National Agricultural Research (ISNAR) have jointly developed a project entitled "Strengthening Agricultural Research Management in the Arab Countries (SARMAC)." The project's objective is to assist national agricultural research systems (NARS) in Arab countries in their efforts to generate and adapt improved agricultural technologies through the development of stronger organizational and managerial capacity in the NARS.

In the first phase of the SARMAC project, the field study methodology was developed by the adaptation and integration of the guidelines for ISNAR reviews and evaluation of NARS with the agricultural technology management system (ATMS) methodology. The field study methodology was field-tested through the review of ATMS in Sudan in late 1987, and a review report was prepared and discussed in a national seminar in August 1988. A final report was published and distributed in 1988. The training component for this phase was partially funded by the Arab Fund for Economic and Social Development (AFESD).

Based on the response from NARS managers to the Sudan study, and in order to meet SARMAC objectives, AOAD and ISNAR developed the second phase of SARMAC, which calls for preparation of three detailed country studies (Iraq, Yemen, and Algeria) during 1989-1991, followed by three national seminars (one for each country) to discuss study findings and recommendations and then followed by a regional seminar. Phase II is a collaborative activity involving the country, AOAD, and ISNAR. The United Nations Development Programme (UNDP) has assisted this phase by providing partial funding.

The field studies were started in Iraq in late 1989 and in Yemen and Algeria in late 1990. Final review reports on the Iraqi and Yemeni NARS were published and distributed in 1992 and 1993, respectively. A review report of the Algerian NARS was published and distributed in spring 1994.

The final stage of the SARMAC project was to hold a regional seminar to discuss common issues and lessons learned from the country studies.

Objectives:
The objective of the seminar was to discuss common issues and lessons learned. In particular the seminar was intended to

- examine and discuss the methodology, conclusions, and recommendations of the country studies;
- broaden the impact of the country studies by including NARS managers from countries that did not participate directly in one of the studies and giving them the opportunity to consider the collected recommendations and conclusions in the context of their own research systems;
- discuss a regional overview synthesis in which common issues and experiences could be identified;
- develop a framework for regional collaboration for improving research management.

Host: Ministry of Agriculture, Republic of Lebanon

Date and Venue: June 14–15, 1994; Arab University of Beirut

Participants:

- 18 research directors and leaders representing 12 Arab countries;
- 1 representative from the World Bank;
- 2 representatives from AOAD;
- 1 representative from ISNAR.

Language: Arabic

Program:

An *opening session* in which three addresses were given, one by the ISNAR representative, one by the Director General of AOAD, and one by the Minister of Agriculture of Lebanon. This session was attended by participants and guests, including ministers, ambassadors, high public officials from ministries and universities, and private-sector representatives.

Four *working sessions* and a *closing session* attended by the seminar participants:

- *1st working session:* Strengthening agricultural research management in Arab countries (SARMAC) project and methodology of conducting country studies;
- *2nd working session:* Four presentations of the country reports: Sudan, Iraq, Yemen, and Algeria;
- *3rd working session:* Agricultural research management systems in Arab countries;
- *4th working session:* The regional cooperation between Arab national agricultural research systems;
- Lively discussions followed each presentation in the four working sessions.
- *Closing session:* Report or the seminar minutes; discussion and adoption of recommendations.

The participants had very lively discussions and acknowledged the contribution of ISNAR/AOAD in the development and implementation of the SARMAC project. They concluded the seminar by developing a set of recommendations dealing with research management improvement.

Recommendations of the Seminar

First: *Research Policies and Plans*

The seminar participants observed that national agricultural research systems/institutions in some Arab countries do not have clear research policies and strategies. Thus, these systems/institutions should develop research policies and strategies with a long-term vision of 10 years or more, and should regularly review these policies and strategies to match them to the changing environment. If requested, ISNAR and AOAD could provide assistance for developing these policies and strategies.

Second: *Review and Evaluation of National Agricultural Research*

1. The seminar participants recommended that research institutions in Arab countries should have their research management and programs reviewed and evaluated periodically by independent and qualified teams, every four to five years.

2. The participants hoped that AOAD and ISNAR could organize training events for research leaders and managers on monitoring and evaluation of research activities.

Third: *Databases on Researchers and Their Research Activities*

The participants recommended that Arab research institutions that do not have functioning computerized databases on their researchers' and research activities should develop them as soon as possible, in order to assist in improving their capacity to plan, program, monitor, evaluate, and coordinate research.

Fourth: *General Issues*

1. The participants recommended that AOAD assist in organizing a two-day annual meeting of directors of Arab research institutions to exchange information and experiences. The cost of this meeting will be shared by the participants and the host country.

2. The participants recommended that AOAD develop a manual combining by-laws, decrees, and regulations of Arab research institutions and that they update this manual annually and distribute it to all Arab NARS.

3. The participants requested the seminar organizers to send, on their behalf, a cable of appreciation and thanks to the Minister of Agriculture for hosting the seminar in Lebanon and to the President of the Arab University of Beirut for providing the seminar facility.

الندوة القومية حول ادارة البحوث الزراعية
في الوطن العربي
(بيروت - لبنان 14-1994/6/15)
(ملخص لمداولات الندوة)

الجلسة الافتتاحية :

عقدت الجلسة الافتتاحية بقاعة جمال عبدالناصر بجامعة بيروت العربية في العاشرة من صباح الثلاثاء 1994/6/14 هذا وقد خاطب حفل الافتتاح الاستاذ الدكتور غازي الحريري منسق إقليمي لغرب آسيا وشمال أفريقيا ممثلاً للمدير العام لمركز الخدمة الدولية للبحوث الزراعية الوطنية (اسنار) ومعالي الدكتور يحيى بكور المدير العام للمنظمة العربية للتنمية الزراعية ومعالي الدكتور عادل قرطاس وزير الزراعة بالجمهورية اللبنانية - راعي الندوة .(نسخه من الكلمات مرفقه طياً). هذا وقد حضر حفل الافتتاح عدد من الوزراء وسفراء الدول العربية واساتذة الجامعات والعاملين بمراكز البحوث الزراعية ووزارة الزراعة اللبنانية وممثلي الهيئات والمنظمات الاقليمية والدولية.

جلسة العمل الاولي :

تم عقد جلسة العمل الاولي بقاعة اجتماعات مجلس جامعة بيروت العربية وقد حضر بداية الجلسة كل من معالي الدكتور على عسيران وزير الدولة اللبناني معالي الدكتور يحيى بكور المدير العام للمنظمة العربية للتنمية الزراعية ومعالي الدكتور عادل قرطاس وزير الزراعة بالجمهورية اللبنانية والذي تحدث حول أهمية البحث الزراعي في احداث التنمية الزراعية مشيراً الى التفاوت الواضح بين الدول العربية في الاهتمام بالبحث الزراعي كما تطرق الى امكانيات العالم العربي وقدرته على انشاء أفضل مراكز للبحث الزراعي وأشاد بانشاء عدد من المؤسسات التمويلية لدعم وتطوير الزراعة العربية كما تقدم بالشكر والتقدير للمنظمة العربية للتنمية الزراعية ومديرها العام معالي الدكتور يحي بكور لجهوده في دعم الزراعة العربية . كما حضرها أيضاً مديرو البحوث الزراعية في (12) دولة عربية هي جمهورية السودان ، جمهورية العراق، جمهورية الجزائر الديمقراطية الشعبية ، المملكة المغربية، دولة قطر، دولة الامارات العربية المتحدة، سلطنة عمان، الجمهورية العربية السورية، جمهورية مصر العربية ، الجمهورية التونسية ، دولة فلسطين والجمهورية اللبنانية إضافة الى رؤساء الفرق المحلية التي أعدت الدراسات القطرية في كل من جمهورية السودان ، جمهورية العراق وجمهورية الجزائر الديمقراطية الشعبية وممثل للبنك الدولي بواشنطن وعدد من العاملين في وزارة الزراعة اللبنانية وقد تم في هذه الجلسة والتي ترأسها الاستاذ الدكتور أديب سعد عميد كلية الزراعة بالجامعة الامريكية ببيروت وكان المهندس راشد خلفان الشريقي مدير ادارة البحوث والانتاج الزراعي بدولة الامارات العربية المتحدة مقرراً لها استعراض مشروع تقوية ادارة البحوث الزراعية في الدول العربية (SARMAC) ومنهجية إعداد الدراسات القطرية بواسطة الدكتور غازي الحريري

(نسخه من المحاضرة مرفقه) وقد اعقب ذلك طرح بعض الاسئلة والاستفسارات كما جرت بعض المداخلات من السادة المشاركين حول المشاكل التي تواجه نظم البحوث الزراعية في دولهم نورد أهم هذه المداخلات فيما يلي:-

- تم التأمين على ضرورة وجود سياسة بحثية تربط بين البرامج البحثية والخطط التنموية واشراك كافة الجهات العاملة في مجال البحث الزراعي والمجالات التنموية المختلفة كالجامعات وكلياتها في هذا الاطار.
- تم التعرف على مساهمات القطاع الخاص في تنفيذ البحوث الزراعية عن طريق انشاء شركات او مختبرات لهذا الغرض في بعض الدول العربية.
- إن وجود خطة بحثية واضحة تنظم البحوث وتحفز الباحثين اضافة الى الاعتماد على البرامج البحثية المتكاملة من الامور التي من شأنها ان تطور البحوث الزراعية في دول المنطقة..
- تعاني بعض الدول العربية من عدم رغبة الباحثين في العمل الاداري وضعف المرتبات وعدم وجود متابعة وتقييم لنتائج البحوث نسبة لعدم وجود جهاز يضطلع بهذه المهمة كما ان عدم استمرارية التمويل الحكومي للبحوث الزراعية تعتبر من الامور التي اثرت سلباً في فعالية نظم البحوث في تلك الدول.

جلسة العمل الثانية :

عقدت جلسة العمل الثانية برئاسة الدكتور غازي الحريري وكان مقررها المهندس طارق بن موسى الزدجالي مدير عام البحوث الزراعية بسلطنة عمان وقد تم فيها استعراض منهجية اعداد الدراسات القطرية والموضوعات التي تناولتها الدراسات اضافة الى التوصيات والمقترحات التي خرجت بها وذلك بواسطة الدكتور عبدالله حمدون والدكتور كمال فلياش والدكتور وليد المراني رؤساء الفرق المحلية التي أعدت الدراسات القطرية في كل من السودان والجزائر والعراق إضافة الى الدكتور الصادق ازرق منسق الدراسة من قبل المنظمة العربية للتنمية الزراعية والذي استعرض الدراسة القطرية للجمهورية اليمنيه نسبه لعدم تمكن رئيس الفريق المحلي من حضور الندوة. كما قدم مدير عام هيئة البحوث الزراعيه في السودان شرحاً للمستجدات التي حدثت في مجال ادارة البحوث الزراعية منذ اعداد الدراسة والمتمثلة في المقترح الخاص بخلق مجلس للبحوث الزراعية وتشكيل مجلس جديد لادارة هيئة البحوث الزراعية يتكون من (26) شخصاً مشيراً الى بعض نقاط الضعف في النظام البحثي في السودان والتي يمكن ايجازها في وجود عدد كبير من القوة البشرية في الجامعات لايستفاد منها في اجراء تنفيذ البحوث وفصل ادارة بحوث الانتاج الحيواني عن بحوث الانتاج النباتي إضافة الى ضعف في نظام اكثار البذور بالرغم من ان الهيكل التنظيمي الجديد لوزارة الزراعة يقضي بأن تنفذ المهام الخاصة بالسياسات في هذا المجال بواسطة هيئة البحوث الزراعية اما المهام الخاصة بالانتاج فتقوم بتنفيذها شركات خاصة كما ان الربط بين البحوث

ونقل التكنولوجيا عن طريق الارشاد الزراعي مازال ضعيفاً. اما المدير الفرعي للبحث الزراعي في وزارة الفلاحة الجزائرية فقد استعرض المستجدات التي حدثت في مجال ادارة البحث الزراعي في الجزائر والمتمثلة في انشاء المجلس الوطني للبحث العلمي والتكنولوجيا والذي يرأسه رئيس الحكومة بهدف تحديد اتجاهات سياسة البحث وتقييم برامج البحوث دورياً ويضم المجلس عدد من اللجان المتخصصة والتي تعمل على تحديد البرامج التي تمول سنوياً وفقاً للاولويات وتشجيع التعاون بين المؤسسات البحثية والاقتصادية في القطر وتحديد الآليات لتحسين المستوي العلمي للباحثين وتطوير اداء الارشاد الزراعي وتنويع البحوث متعددة التخصصات كما بدأ في تنظيم حلقات دراسية متخصصة لتقييم البحوث وتحديد الاستراتيجيات متوسطة وبعيدة المدي فضلاً عن امكانية انشاء شبكة للاعلام العلمي والتقني على مستوي القطاع الزراعي - وبعد نقاش مستفيض وتداخلات عدة برزت المؤشرات التالية في مجال ادارة البحث الزراعي:

- غياب السياسات والاستراتيجيات المنظمة للبحث الزراعي في معظم الدول .
- هناك حاجة لتدريب قيادات البحث الزراعي في مجال تقييم برامج البحوث ومتابعتها.
- قيام بعض الدول بانشاء مجالس للبحوث العلمية والغاؤها بعد سنوات مما يستوجب الدراسة.
- ضرورة ربط الابحاث التي تجري في الجامعات مع الخطط التنموية للدول.

جلسة العمل الثالثة :

ترأس جلسة العمل الثالثة الدكتور عبدالسلام جمعه مدير مركز البحوث الزراعية بجمهورية مصر العربية وكان السيد منير الهدري مدير ادارة التخطيط ومتابعة تقييم برامج البحث بالجمهورية التونسية مقرراً لها وقد تم في هذه الجلسة استعراض عام لادارة نظم البحوث الزراعية في المنطقة العربية والبرنامج المستقبلي لدراسة نظم ادارة البحوث الزراعية في المنطقة العربية من ممثل (الاسنار) وقد تلخصت أهم النقاط التي تم استعراضها في الاولويات في ادارة البحوث وسياسات البحوث وادارة موارد البحث الزراعي والتنظيم والهياكل الادارية والاتصالات والموارد البشرية وقواعد البيانات والتقييم الدوري لمؤسسات البحث وبرامج البحوث وقد تخللت الجلسة العديد من الاستفسارات والمداخلات وفيما يلي أهم ماتوصلت اليه الجلسة:

- أهمية وضع استراتيجيات للبحث الزراعي في الدول العربية.
- ضرورة تأهيل العنصر البشري لضمان تنفيذ تلك الاستراتيجيات بصورة سليمة .
- ضرورة وضع منهجية للمراجعة المؤسسية.

جلسة العمل الرابعة :

تم عقد جلسة العمل الرابعة برئاسة البروفسير عثمان احمد علي عجيب مدير هيئة البحوث الزراعية بجمهورية السودان والسيد عبدالرحمن محمد يوسف المحمود مدير ادارة البحوث الزراعية والمائية بدولة قطر مقرراً وقد خصصت هذه الجلسة للتباحث في التعاون الاقليمي لتعزيز وتحسين اداء مؤسسات البحث الزراعي العربي وقد ترك المجال لقادة البحث الزراعي للادلاء بآراهم حول موضوع الجلسة وقد برزت المؤشرات التالية في هذا المجال:

- ضرورة توحيد لغة البحث في جميع الدول العربية مع دراسة إمكانية قيام المنظمة العربية للتنمية الزراعية جمع مايتم انجازه من بحوث في مختلف الدول العربية وتعميمها لما لذلك من انعكاسات كبيرة على المستويين القطري والاقليمي.
- ضرورة التعرف على ماهو متاح من نظم للمعلومات في كل دولة تسهيلاً لربط مراكز البحوث الزراعية داخل الدولة او مع المراكز في الدول الاخري .
- من المفيد خلق نظام لربط المعلومات على مستوي الاقاليم في الوطن العربي كخطوة اولية تليها ربط كل الدول العربية ببعضها البعض او ربط الاقاليم ببعضها البعض.
- من المهم في هذه المرحلة أن تبدأ الدول التي ليس لديها سياسات بحثية في وضع مثل هذه السياسات مستفيدة من تجارب الدول الاخري التي أعدت مثل هذه السياسات.
- التركيز على تبادل المعلومات حول الاجراءات والقوانين الادارية التي تنظم البحوث الزراعية في الدول العربية.

جلسة العمل الخامسة :

تم في هذه الجلسة التي ترأسها الدكتور الصادق الفاضل ازرق منسق المشروع من قبل المنظمة العربية للتنمية الزراعية وكان الدكتور غازي الحريري مقرراً لها مناقشة التوصيات التي تمت صياغتها على ضوء المناقشات والمداخلات التي تمت خلال الاربع جلسات السابقة وقد تم الاتفاق على توصية واحدة خاصة بالسياسات والخطط البحثية وتوصية ثانية في مجال نظم المعلومات البحثية وتوصيتين في مجال مراجعة وتقويم البحوث الزراعية الوطنية وثلاثة توصيات خاصة بالمجالات العامة.كما اقترح المشاركون ارسال برقيتي شكر لمعالي وزير الزراعة اللبناني وسيادة رئيس جامعة بيروت العربية.

أسماء المشاركين
الندوة القومية حول ادارة البحوث الزراعية
في الوطن العربي
(بيروت - لبنان 14-1994/6/15)

1- الدكتور غازي الحريري	مركز الخدمة الدولية للبحوث الزراعية الوطنية (اسنار) لاهاي - هولندا
2- الدكتور الصادق الفاضل ازرق	المنظمة العربية للتنمية الزراعية - الخرطوم - السودان
3- الدكتور أديب سعد	عميد كلية الزراعة وعلوم الأغذية - الجامعة الامريكية بيروت لبنان
4- الدكتور فؤاد سعد	وزارة الزراعة - بيروت - لبنان
5- الدكتور معين حمزة	رئيس مجلس ادارة مصلحة البحوث العلمية الزراعية - تل العماره - لبنان
6- الدكتور خليل خزاقة	مدير عام مصلحة البحوث الزراعية - تل العماره - لبنان
7- الدكتور عثمان احمد علي عجيب	مدير عام هيئة البحوث الزراعية - وادمدني - السودان
8- الدكتور عبدالله حمدون	هيئة البحوث الزراعية - واد مدني - السودان
9- الدكتور عبدالسلام جمعة	مدير مركز البحوث الزراعية -القاهرة - مصر
10- الدكتور حسن الأحمد	مدير البحوث العلمية الزراعية - وزارة الزراعة والاصلاح الزراعي - دوما - سوريا
11- الدكتور يوسف الشهابي	ممثل فلسطين - خبير في الدراسات الاقتصادية دمشق - سوريا
12- الدكتور رضوان خليفة عبدالحليم	مدير عام الهيئة العامة للبحوث الزراعية - وزارة الزراعة- ابوغريب - العراق
13- الدكتور وليد خضير المراني	كلية الطب البيطري -جامعة بغداد - بغداد - العراق
14- الدكتور سعيد طالب	مدير فرعي للبحث الزراعي - وزارة الفلاحة - الجزائر
15- الدكتور كمال فلياشي	أمين عام المعهد التقني للمحاصيل الحقلية - الجزائر - الحراش - الجزائر
16- الدكتور محمد عبدالمجيدالأدريسي	مدير التكوين والاعلام - المعهد الوطني للبحث الزراعي - الرباط
17- السيد عبدالرحمن محمد يوسف	مدير ادارة البحوث الزراعية والمائية - الدوحة - قطر
18- السيد منير الهدري	مدير التخطيط ومتابعة تقييم برامج البحث وزارة الفلاحة - تونس
19- السيد طارق بن موسي الزدجالي	مدير عام البحوث الزراعية - مسقط - سلطنة عمان
20- السيد راشد محمد خلفان	مدير ادارة الابحاث والانتاج الزراعي- دبي - دولة الامارات العربية المتحدة
21- الدكتور بن علي	البنك الدولي - واشنطن - الولايات المتحدة الأمريكية