CGR13
September 1986

Consultative Group on International Agricultural Research
CGIAR
Study Paper Number 13

Syria and the CGIAR Centers

A Study of Their Collaboration in Agricultural Research

Hisham El-Akhrass

Syria and the CGIAR Centers

CGIAR Study Papers

No. 1	Technological Innovation in Agriculture: The Political Economy of Its Rate and Bias
No. 2	Modern Varieties, International Agricultural Research, and the Poor
No. 3	Plant Genetic Resources: The Impact of the International Agricultural Research Centers
No. 4	Costa Rica and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 5	Guatemala and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 6	Zimbabwe and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 7	Nepal and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 8	Bangladesh and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 9	Brazil and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 10	Indonesia and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 11	Ecuador and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research
No. 12	Peru and the CGIAR Centers: A Study of Their Collaboration in Agricultural Research

Consultative Group on International Agricultural Research

CGIAR

Study Paper Number 13

Syria and the CGIAR Centers

A Study of Their Collaboration in Agricultural Research

Hisham El-Akhrass

The World Bank
Washington, D.C.

1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

First printing September 1986

Manufactured in the United States of America

At its annual meeting in November 1983 the Consultative Group on International Agricultural Research (CGIAR) commissioned a wide-ranging impact study of the results of the activities of the international agricultural research oganizations under its sponsorship. An Advisory Committee was appointed to oversee the study and to present the principal findings at the annual meeetings of the CGIAR in October 1985. The impact study director was given responsibility for preparing the main report and commissioning a series of papers on particular research issues and on the work of the centers in selected countries. This paper is one of that series.

The judgments expressed herein are those of the author(s). They do not necessarily reflect the views of the World Bank, of affiliated organizations, including the CGIAR Secretariat, of the international agricultural research centers supported by the CGIAR, of the donors to the CGIAR, or of any individual acting on their behalf. Staff of many national and international organizations provided valued information, but neither they nor their institutions are responsible for the views expressed in this paper. Neither are the views necessarily consistent with those expressed in the main and summary reports, and they should not be attributed to the Advisory Committee or the study director.

This paper has been prepared and published informally in order to share the information with the least possible delay.

Hisham El-Akhrass, an agricultural economist and former deputy minister of planning in Syria, is currently a consultant on agricultural development in the Arab world.

Library of Congress Cataloging-in-Publication Data

El-Akhrass, Hisham, 1933-
Syria and the CGIAR centers.

(Study paper / Consultative Group on International Agricultural Research, ISSN 0257-3148 ; no. 13)
Bibliography: p.
1. Agriculture--Research--Syria. 2. Consultative Group on International Agricultural Research. 3. Agriculture--Research--International cooperation. I. Title. II. Series: Study paper (Consultative Group on International Agricultural Research) ; no. 13.
S542.S95E4 1986 630'.7205691 86-18980
ISBN 0-8213-0822-X

Summary

Syria is an east Mediterranean country, with a total area of 18.5 million hectares and a population of 9.9 million. The annual cropped area of about 4 million hectares, along with 10 million hectares of rangeland, contributes 20 percent of total GDP of SL 72.7 billion.

Farming is predominantly rainfed, for irrigation is available to only 14 percent of the total cultivated area of 6.1 million hectares. Rainfall is erratic, and crop production fluctuates from year to year. Wheat, barley and food dry legumes occupy about 75 percent of the total cropped area. They are produced by individual farmers and are marketed and priced by the State.

The agricultural research system is composed of several agencies, with no coordination between them. Two directorates of the Ministry of Agriculture and Agrarian Reform (MAAR)--the Scientific Agricultural Research Directorate (SARD) and the Soils Directorate (SD)--conduct most of the research work. Other research bodies focus on commodities.

In 1983, SL 17.4 million (1.2 percent of the total allocation for agricultural development) was allocated to agricultural research. The total research expenditure, capital and current, of SL 28.9 million constitutes 0.19 percent of gross agricultural product and 0.02 percent of total GDP.

About 500 research workers are employed by the system, 50 percent of them by SARD. Aside from the 54 PhD and MS holders, the majority of research workers need additional scientific training.

SARD maintains limited contact with IBPGR, ISNAR, CIP and IFPRI. Its relationship with CIMMYT has existed since the 1950s.

Germplasm for wheat and maize and training opportunities are provided annually. High-yielding varieties of wheat developed by CIMMYT were imported in the early 1970s and brought about a revolution in wheat production. Average annual production has risen from 930,000 tons to 1,670,000 tons, and the long-run production trend has been stabilized. CIMMYT, however, has not been able to influence the structure or methodology of research in Syria.

ICARDA has been in Syria since 1977 and its presence has been felt in many areas. ICARDA strategy has followed two directions. First, it has emphasized the building up of Syria's research capacity as a prerequisite for implementing a sound and productive research program. Second, it has stressed the importance of increasing the productivity of dry-farming crops, especially barley and chickpea, two important but ignored crops.

A collaborative Research and Training Program, agreed upon by MAAR and ICARDA, has been the vehicle used to implement ICARDA's strategy. The program handles four aspects of cooperation: (1) joint research in the fields of cereals, food dry legumes and forage crops; (2) multidiscipline, multiperiod training courses; (3) a stream of information in various forms of publications; and (4) technical and financial support.

Under the program, new varieties of wheat, barley and chickpea have been developed; some of them have been prematurely released and need further verification. Research on farm practices is promising, but understandably more time is needed for concrete results. However, some new findings are readily applicable, and measures should be taken to transfer them to the farmers through the extension service.

For the collaborative program to be more effective, an enlarged scheme of academic training for Syrian research workers is badly needed. The postgraduate program currently being

carried out by ICARDA and the Aleppo Faculty of Agriculture could serve this purpose.

Acknowledgments

I am indebted to the persons listed in the appendix to this study. They were helpful in providing services, information, observations and comments. Support given by Dr. M. A. Nour, Director General of ICARDA, and Mr. H. Saoud, Deputy Minister of Agriculture and Agrarian Reform, is highly appreciated. Special thanks go to Dr. R. Kanbar, Director of Research, MAAR, Dr. J. Abdul Karim, Director of Soils, MAAR, and Mr. K. El-Arab, Chief, Field Crops Research Section, for their valuable assistance.

Contents

Abbreviations and Acronyms

ACSAD	The Arab Center for the Studies of Arid Zones and Dry Lands
CB	Cotton Bureau
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Center for the Improvement of Maize and Wheat
CIP	International Potato Center
GADEB	General Administration for the Development of Euphrates Basin
GOS	General Organization for Sugar
GOT	General Organization for Tobacco
IARC	International Agricultural Research Center
IBPGR	International Board of Plant Genetic Resources
ICARDA	International Center for Agricultural Research in the Dry Areas
IFPRI	International Food Policy Research Institute
ISNAR	International Service for National Agricultural Research
MAAR	Ministry of Agriculture and Agrarian Reform
NARS	National Agricultural Research System
SARD	Scientific Agricultural Research Directorate
SD	Soils Directorate

1 Background

1.1 The country

1.1.1 Natural and political setting

Syria overlooks the east coast of the Mediterranean Sea, with a total area of 18.5 million hectares, of which 6.1 million hectares (33 percent) is cultivable.

From the natural geographical standpoint, the country may be divided into four zones extending west-east as follows: (1) the coastal plain, with an area of 40,000 hectares of fertile soil and plenty of rainfall; (2) the mountains and hilly zone, extending from the north to the south, parallel to the coast, covering 8 percent of the total area of the country; (3) the inland plains, occupying about 37 percent of total area, and extending from the northeast westwards to the south and southwest; and (4) the steppe, where natural grazing, sheep husbandry, is practiced, occupying about 55 percent of the country's total area.

The country is generally dominated by the Mediterranean climate, characterized by a rainy winter and long, dry summer. Rainfall decreases eastwards from 800-1000 mm to less than 200 mm in the steppe. December and January are the coldest months of the year, when temperature drops a little below zero centigrade, while July and August are the warmest period when 48°C is usually recorded.

Total water resources are estimated at 60 billion cubic meters a year (without Euphrates River resources), of which 50 billion is rainfall, 8 billion is surface water of rivers, springs, and seasonal streams (excluding Euphrates), and 2 billion is underground, restored water.

Administratively, the country is divided into 14 units called Mohafaza, including the Mohafaza of the City of Damascus, the Capital of the Republic. The Mohafaza is divided into Mantika, and there are a total of 59 Mantika. The latter is in turn divided into Nahia, and there are a total of 179 Nahia. The Nahia is composed of a number of villages, which are the smallest administrative unit. There are 6,501 villages.

Political life in Syria is led by the Socialist Arab Ba'Ath (Resurgence) Party, whose Secretary General is the President. People's organizations play an active political role. The farmers' political and cooperative activities are organized and led by the General Peasants Federation (Union).

1.1.2 Population

For mid-1984, the population of the Syrian Arab Republic is estimated at 9,934,000 inhabitants. The population has been growing at an annual rate of 3.4 percent for the period 1980-84. As a result of population increase, average population density has increased from 34 persons per square kilometer in 1970 to 49 persons in 1981.

During the period 1970-81, the sex ratio (number of males per 100 females) has decreased from 105.3 to 104.4, while average family size has increased from 5.9 persons to 6.3 persons.

Due to heavy migration to urban areas, the rural population has decreased from 56.5 percent in 1970 to 51.9 percent in 1984. The movement has concentrated towards the three major cities, i.e., Damascus, Aleppo, and Homs. According to 1981 statistics, more than half the Syrian population lives in 4 of the 14 Mohafaza, namely, the City-of-Damascus Mohafaza, Damascus Mohafaza, Aleppo Mohafaza, and Homs Mohafaza.

1.1.3 Economy

Total GDP at factor cost and current prices is estimated for

1983 at SL 72,747 million, per capita GDP being SL 7,569, equivalent to $1,928 at 1983 official rate of exchange. The three commodity producing sectors, i.e., agriculture, industry, and construction, have contributed 48 percent to GDP, as detailed in Table 1.1.

Table 1.1 Percent of GDP by Commodity Sector

Commodity Sector	Percent
Agriculture, Forestry and Fishing	21
Industry, Energy and Mining	20
Building and Construction	7
Wholesale and Retail Trade	23
Transportation, Communication and Storage	7
Finance, Insurance and Real Estate	5
Community and Personal Services	2
Government Services	15

The GDP growth rate has been decreasing, e.g. for 1970-75 the annual rate of growth was 13 percent, for 1975-80 the rate was 4.5 percent and for 1980-83 it was 3.8 percent.

Economic activities provided jobs in 1983 to about 2,246,000 workers. Between 1970 and 1983, the share of agriculture in employment has decreased absolutely as well as relatively from 51.5 percent to 31.7 percent, as depicted in Table 1.2.

For the last ten years, 1974-83, deficit in the commodity balance of trade has ranged between SL 1.7-10.2 billion ($0.46-2.6 billion). Commodity imports have increased from SL 4.8 billion ($1.3 billion) to SL 18.5 billion ($4.7 billion), while commodity exports have improved less, from SL 3.1 billion

($0.8 billion) to SL 8.3 billions ($2.1 billion). Surplus in the service balance has occurred only in 2 years.

As a measure toward rationalizing foreign trade and foreign currency movement, three rates of exchange are now officially in use. At the end of 1984, one U.S. dollar is changed for SL 3.925 at the Official (government) Rate; SL 5.425 at the Parallel Market Rate; and SL 8.125 at the Tourist Rate. The second rate is mainly used to clear the private sector trade transactions.

Table 1.2 Percent of Employment by Commodity Sector

Commodity Sector	1970	1983
Agriculture	51.5	31.7
Industry and Mining	13.4	14.7
Building	7.1	14.1
Trade and Finance	10.0	10.9
Transport and Communications	4.2	6.2
All Services	13.8	22.4

In the 1984 total budget, development and current allocation of SL 41,289 million, the Services Sector alone got about 65 percent. Other sectors' share ranged between 1.2 and 7.8 percent, as shown in Table 1.3.

1.2 The agricultural sector

1.2.1 Structure

On the basis of the annual rainfall probability, the country is divided into five Agricultural Stabilization Zones:

Zone 1: Rainfall exceeds 350 mm, and is no less than 300 mm in two-thirds of the recorded years. Area is approximately 2,694,000 ha, representing 14.5 percent of the total country area, 50 percent of which is cultivated.

Zone 2: Rainfall is 250-300 mm, and area is approximately 2,475,000 ha, representing 13.4 percent of the total country area, of which 48 percent is cultivated.

Zone 3: Rainfall is no less than 250 mm in half the recorded years. Area is approximately 1,305,000 ha, representing 7 percent of the total country area, of which 43 percent is cultivated.

Zone 4 (Marginal area): Rainfall is between 200-250 mm and does not go below 200 mm in half the recorded years. Area is approximately 1,822,000 ha, representing 9.8 percent of the total country area, of which 34 percent is cultivated.

Zone 5 (The Steppe or Rangeland): Rainfall is less than 200 mm, not enough to raise viable crops. Area is approximately 10,222,000 ha, representing 55.3 of the total country area, of which only 3.4 percent is cultivated, mainly under irrigation.

Of the total cultivable area of 6,105,000 ha, 67 percent is cultivated, 25 percent is left annual fallow, and the remaining 5 percent is not cultivated for various reasons. In 1983, about 72 percent of the cultivated area was located in Zones 1 and 2. Rainfed farming is predominant because only 14 percent of the total cultivated area is irrigated. Eighty percent of that area is irrigated by pumping from rivers and wells.

During the last 10 years, the cropping pattern shown in Table 1.4 has been maintained.

Table 1.3 Budget Allocations by Commodity Sector for 1984

Commodity Sector	SL million	Percent
Community, Social and Personal Services	26,860	65.1
Agriculture, Forestry and Fishing	3,211	7.8
Mining	1,161	2.8
Manufacturing	1,697	4.1
Electricity, Gas and Water	1,672	4.0
Building and Construction	555	1.3
Trade	1,030	2.5
Transport, Communication and Storage	2,577	6.2
Finance, Insurance and Real Estate	477	1.2
Unallocated	2,049	5.0
Total	41,289	100.0

Table 1.4 Cropping Pattern Over the Last 10 Years by Percent

Crops	Total Area	Rainfed	Irrigated
Food Cereals[1]	37.3	34.1	27.9
Food Legumes	4.6	5.1	2.1
Fodder Crops[2]	33.4	38.1	9.1
Industrial Crops[3]	6.7	1.5	33.8
Vegetables	6.6	4.4	18.1
Fruit Trees	11.4	11.8	9.0

1 Mainly wheat.

2 Mainly barley.

3 Cotton, tobacco and sugarbeet.

Agricultural production is predominated by crops (plant production), as the latter constitute 65-75 percent of the value of agricultural production. In 1983, total animal units are estimated at 2 million units. Their type and equivalent number of animals is shown in Table 1.5.

Table 1.5 Total Animal Units and Numbers in 1983

Animals	Units (000)	Number (000)
Cattle	446	652
Sheep and Goats	2,372	14,517
Poultry	60	14,616

According to the 1970 Agricultural Census (1981 Census Results are not yet available), total cultivable area is divided into 396,000 holdings, each with an average of 4 pieces. Small holdings of less than 10 ha each constitute 75 percent of the total number of land holdings, the average holding area being 8.5 ha.

1.2.2 Infrastructure and institutional support

The state, through its five specialized marketing corporations, undertakes exclusively all marketing functions of the following basic, strategic farm products: wheat and flour, barley, lentils, chickpeas, cotton and products, tobacco, peanuts and sugar beets. These crops occupy 75 percent of total irrigated land, and 90 percent of total rainfed land.

Other perishable farm products, such as fresh fruits and vegetables, and livestock products, including poultry, are competitively handled by the public, cooperative, and private sectors.

The objectives of the farm marketing policy, as invariably documented and actually implemented, are to easily reach the producers, quickly receive the crops, and promptly effect payments.

However, other considerations still need to be taken care of with this policy, particularly: (1) to keep analyzing marketing costs, so as to show clearly the producers' share in the consumers' prices; (2) to make sure that consumers' markets are always satisfied; and (3) to maintain relative price stability in the open markets.

Credit and input supply systems are covered by one joint policy. Supply of basic farm inputs, including fertilizers, seeds, bags, pesticides, farm machinery, and imported dairy cattle, is handled by the Agricultural Cooperative Bank, the only farm-lending institution.

Locally produced as well as imported feed stuffs are supplied by a specialized public corporation. The private sector has just been allowed to import and distribute all kinds of feed stuffs, along with the public sector.

These two agencies operate a nationwide network of distribution centers. Long-term and seasonal in-kind credit is encouraged. Cooperatives' needs for seasonal credit are fully met. Cooperatives enjoy special discounts of 1.5 percent for the interest rate and 5 percent for the input prices. The cooperative sector gets more credit than its share in agricultural land or production; its credit is also growing at a faster rate than that of the private sector, as shown in Table 1.6.

The system is reasonably functioning. However, flexibility is needed to meet certain unexpected supply bottlenecks and to import at the lowest possible prices. Paperwork and "red tape" in loan processing and input distribution need to be minimized.

A system of field operation follow-up, and performance assessment should be adopted.

Table 1.6 Growth of Credit by Sector in SL (million)

Year	Public Sector	Cooperative Sector	Private Sector	Total
1979	14	175	238	427
1980	17	188	242	446
1981	31	260	294	585
1982	28	309	355	703
1983	31	407	438	876

Source: Central Bureau of Statistics "Statistical Abstract," p. 164.

Cooperative farming is highly encouraged. During the last 5 years, 1979-83, the number of cooperatives has increased from 3,498 societies, cultivating 26 percent of total cultivated area, to 3,903 societies, cultivating 32 percent of the area. Of the latter number, 81 percent are multi-purpose service societies, about 0.2 percent (7) are collective production cooperatives, while the rest are various types of animal husbandry service societies. Thirty-three to 50 percent of the wheat, cotton and sugar beet crops, 61 percent of milk, and 34 percent of eggs are produced under cooperative farming.

1.2.3 Pricing

For those farm products and inputs that are exclusively marketed by the state, prices are determined by the state (see section 1.2.2). The prices have to be announced prior to the cultivation season, related to crop qualities, and unified all over the producing areas. They must cover all costs of production and allow for a profit margin of around 20 percent.

Farm prices determined for five major crops are shown in Table 1.7.

Table 1.7 Farm Prices at SL per Ton

Year	Wheat Durum	Wheat Bread	Barley	Lentils	Seed Cotton	Sugar Beet
1979	700	620	510	850	1,880	175
1980	800	700	570	1,350	2,250	220
1981	1,050	950	720	1,900	3,200	290
1982	1,320	1,190	800	2,250	3,850	310
1983	1,380	1,230	820	2,500	4,000	330

Source: CBS "Statistical Abstract, 1983," p. 166.

Pricing is one of the strongest tools of the economic policy. For instance, wheat is priced above world price level; improved, certified seeds, especially for wheat, are priced below cost. The objective is clearly to encourage and expand cereal production. On the other hand, the export price of cotton exceeds the farm gate determined price by 26-63 percent for the period 1976-80. The objective here is to augment treasury resources.

Heavily affected by the internal forces of supply and demand, other farm products destined for direct consumption like fresh fruits and vegetables, meat and dairy products are priced by local government authorities. Prices are subject to frequent fluctuation and to location differences.

The above described pricing mechanism ensures price and income stability for the majority of farmers and is meant to serve development objectives. It raises, however, a few methodological issues relating to the concepts of production costs and net

profit. The question of how the burden of the government price subsidy is allocated is still pending.

1.2.4 Sector performance

In 1983, Net Agricultural Product amounting to SL 14,976 million has contributed 21 percent to total NDP at factor cost and current prices. For the last 10 years, 1974-83, the agricultural sector has maintained a 20 percent contribution to NDP. With its decreasing share in total employment from 52 percent to 32 percent, labor productivity in agriculture is improving a lot, but still much below labor productivity in other sectors.

The total growth of agriculture over the last decade of 68 percent (Net Agricultural Product at Fixed Prices, 1974-83) has been made possible only through improvement in crop management under irrigation and other controlled conditions like dairy and poultry farms, as indicated in Table 1.8. Total production and yield of rainfed crops, i.e., wheat, barley, food dry legumes (lentil, chickpea and faba beans) and olive have been stable or decreasing, except for the doubling of barley area, resulting in a 59 percent increase in production. Since the wheat revolution of the early 1970s, annual wheat production has averaged 1.66 million tons, an increase of 80 percent over the previous average of 0.92 million tons (See section 4.1).

Except for cotton, area expansion has outweighed yield increase in pushing up total production of irrigated crops. However, four important irrigated crops, namely cotton, sugar beet, tomato and apple, have achieved a yield icrease of 55-83 percent over the period of 10 years. The expansion in total production of such food items as potato, tomato, sugar beet, apple, citrus, milk and eggs is notably amazing. The 12 crops presented in Table 1.8 occupy 90 percent of total cropped area.

Table 1.8 Production and Yield of Major Agricultural Products in Syria, 1974-83

	Production			Yield		
	1974	1983	%	1974	1983	%
Rainfed						
Wheat	1,630	1,612	0	1.06	1.20	13
Barley	655	1,043	59	0.94	0.70	-26
Food Legumes	151	149	0	0.84	0.77	-13
Olive	215	152	-29	13.962	6.613	-53
Irrigated						
Maize	19	27	42	1.42	1.40	0
Potato	105	315	200	12.45	15.70	26
Tomato	395	831	110	13.23	20.50	55
Cotton	387	526	36	1.88	3.00	60
Sugar Beet	239	1,158	385	21.35	39.10	83
Apple	44	128	191	18.21	28.48	57
Citrus	32	91	184	34.24	44.74	13
Grapes	250	389	56	4.659	6.478	38
Animal Products						
Milk	500	1,161	132	--	--	--
Eggs	370	1,725	366	--	--	--

Units

Production: 1,000 tons, except eggs in million eggs.

Yield: Tons per hectare, except fruit trees ton per 1,000 fruit trees.

Source: Ministry of Agriculture, "The Annual Agricultural Statistical Abstract, 1983."

In spite of these increases, the country is still far from self-sufficient in food items. Deficit in the food trade balance has grown from SL 1,080 million in 1974 to SL 3,001 million in 1983. Wheat, rice, sugar and fruits are the biggest items on the list. Export of non-food farm products, mainly cotton (70%), comes to SL 700-800 million a year.

2 The National Agricultural Research System

2.1 Overview

The history of agricultural research in Syria is rather recent. The creation of the first agricultural research institution goes back to the mid sixties (1964), when the Scientific Agricultural Research Directorate (SARD) was established as a new additional central unit in the Ministry of Agriculture and Agrarian Reform (MAAR). Before that, research work, however limited, was carried out by the various sectoral units of MAAR, along with their other duties such as production, service, provision, policy formulation, etc.

The newly set up research unit has been given specific research tasks which can be broadly defined as:

1. Carry out applied agricultural research and studies.
2. Survey most important problems and obstacles hindering the advancement of agriculture, including crops and livestock production; classify them according to order of importance, and attempt to find proper solutions.
3. Coordinate research projects with national research bodies and make use of research done by national and international research institutions.
4. Coordinate with agricultural extension service and other agricultural services so that research findings are transferred to field workers.
5. Establish and continuously stock an Agricultural Library with agricultural scientific references, and translate, publish and exchange important local and foreign research studies and reports.
6. Develop research workers' capabilities, mainly through national and international training courses and scientific visits.

SARD is the sole body in Syria responsible for research projects and crop varieties development in the following fields: food field crops (including cereals and food grain legumes); vegetables and fruit trees; plant protection; food processing; and animal production.

Three other directorates under MAAR conduct research projects in other fields of agriculture. Soil Directorate (SD) carries out research in soil classification, fertility and land and water use. Research on cotton varieties and practices is entirely left to the Cotton Bureau. The Directorate of Steppe, Rangeland and Sheep is concerned with research to improve forage plants and sheep quality in the dry areas (the Steppe).

There are also other agencies not under MAAR which carry out research projects in agriculture, such as the General Administration for the Development of the Euphrates Basin (GADEB); the General (Public) Organization for Sugar (sugar beets); and the General (Public) Organization for Tobacco. Modest research projects are attempted by the Faculties of Agriculture in Damascus, Tishreen, and especially Aleppo.

These research institutions by no means constitute a cohesive research system, because no coordination of any sort exists between them. All efforts to set up various kinds of committees or organizations to coordinate research efforts have so far failed. In such a situation, although overlapping areas are rather narrow, duplication of work and gaps exist, and priority allocations of research projects is not possible.

However, it seems that recent attempts at such coordination are nearly successful, as the Prime Minister's office has given a green light to the idea of establishing an independent, semi-autonomous national institute for agricultural research.

Agricultural research in Syria is strictly government business; private firms have never conducted such research. However, two non-Syrian centers, located in Syria, are doing agricultural research projects on a large and advanced scale.

The first is the Arab Center for the Studies of Arid Areas and Dry Zones (ACSAD), which is a part of the Arab League System. ACSAD efforts go beyond food crops to such wider, complementary areas as soil, ground and surface water, fruit trees and animal production.

The second is the International Center for Agricultural Research in the Dry Areas (ICARDA), supported by the Consultative Group on International Agricultural Research (CGIAR). The center is mainly concerned with developing new high-yielding varieties and improved technology to increase the productivity of food crops. Its activities are reflected in the following four programs: cereals (wheat and barley); food legumes (faba beans, lentil and chickpea); pastures, forage and sheep; and farming systems. In addition, ICARDA is actively engaged in such fields as training and exchange of information, documentation and genetic resources.

Syrian research bodies collaborate with other CGIAR centers. CIMMYT, most importantly, directly provides maize germplasm, consultation, technical equipment, information and training facilities. It offers, through ICARDA, wheat germplasm. Collaboration with ICRISAT is also carried out through ICARDA.

IBPGR collaborates closely with ACSAD and has organized a training course and joint field work. IBPGR also has provided continuing technical assistance to Syria's National Genetic Resources Program since 1977 through the plant genetic resources unit of the directorate of agricultural research.

2.2 Institutional structure

Even though agricultural research work in Syria is a scattered, multi-agency type, a major part of it is done by SARD and SD, two distinctive bodies, having both national geographical coverage and a wide range of interests.

SARD's structural unit is the section, each of which contains from three to seven departments. The SARD Head Office organizational structure is composed of the following six sections: Field Crops Research Section; Plant Protection Research Section; Fruit Trees Research Section; Vegetable Research Section; Food Technology Research Section; and Animal Production Research Section. Under this structure, research projects cover all food commodities, as depicted in Table 2.1.

The Head Office operates 17 research centers and stations, where field research work is carried out. There are four more centers under way. Usually, each center includes six departments, similar to the six sections of the Head Office. These centers and stations extend all over the country with a total area of 1,450 hectares, of which 60 percent is rainfed in the first and second rainfall stabilization zones.

SARD organization is missing a section or department for planning, programming or follow-up, which is a prerequisite for such a large multitask administration. The director and deputy seem to take up this matter. They centrally prepare a draft annual research plan, to be discussed in an annual meeting by the chiefs of the Head Office sections and research centers. In light of the previous year plan evaluation and the project phasing, the new-year plan is decided upon. Research priorities and financial and personnel resources available are taken into consideration.

Table 2.1 Organizational Structure of the Scientific Agricultural Research Directorate

Director

Deputy Director

Sections — General Relations Section

Field Crops	Plant Protection	Horticulture	Vegetables	Food Technology	Animal Production
Departments:	Departments:	Departments:	Departments:	Departments:	Departments:
Cereals	Entomology	Pommes	Cucurvitacea	Fats and Oil	Sheep Breeding
Maize	Phytopathology	Stone Fruits	Leguminocea	Food Preservation	Goat Breeding
Forage	Pesticides	Grapes	Fruiting Vegetables	Mushroom Preservation	Development
Legumes and Oil Seed		Nuts, Figs and Pistachio	Root Vegetables	Laboratory	
Sugarbeet		Flowers	Leafy Vegetables		
Plant Genetic Resources			Protected Vegetables		
Agricultural Practices					

Agricultural Research Stations

Source: Directorate of Agricultural Research, MAAR.

It is worth noting that research projects on cereals, food legumes, forage and farm practices fall under one section, namely Field Crop Research Section.

The section is also an SD structural unit with between three and seven departments. The SD organizational structure is composed of seven sections: the Land Classification and Pedological Research Section; the Soil Fertility and Plant Nutrition Section; the Reclamation (irrigation, drainage and water requirements) Section; the Land Use Section; the Laboratories Section; the Agricultural Ecology and Climatology Section; the Soil Conservation Section (frozen); and Soil Physics Section which was added recently.

They, along with related departments, are shown in Table 2.2. The SD Head Office operates seven research and experimentation centers, distributed all over the country. Activities of each center normally reflect the surrounding environment and cropping pattern such as irrigated or rainfed crops, horticulture, salinity problems, sprinkle irrigation, etc.

2.3 Allocated resources

In 1983, total development expenditure of SL 17.4 million was allocated to agricultural research, constituting such very small proportions as: 1.2 percent of total expenditure allocation to agriculture, including irrigation schemes; 3.1 percent of total expenditure allocation to agricultural development proper (without irrigation); 0.1 percent of Gross Agricultural Product; and 0.02 percent of Gross Domestic Product.

The amount of SL 17.4 million was allocated to the various research agencies as follows: SL 8,410,000 to SARD; SL 4,632,000 to SD; SL 1,394,000 to CB; SL 1,200,000 to GADEB; and SL 1,780,000 to GOT.

Table 2.2 Organizational Structure of the Soils Directorate

Director

Deputy Director

Sections			Sections			
Land Classification	Soil Fertility Plant Nutrition	Reclamation (Water Use)	Land Use and Appraisal	Laboratories	Agricultural Ecology	Soil Conservation
Departments			Departments			
Land Classification	Field Crops	Irrigation	Land Use and Assessment	Laboratory Research	Plant Taxonomy and Vegetation Cover	Erosion Control
Mapping and Aerial Photos	Vegetables	Drainage	Crop Rotation	Central Laboratory	Agricultural Climatology	Soil Maintenance
Remote Sensing	Fruit Trees	Reclamation	Economic and Social Appraisal	Regional Laboratory	Agricultural Pollution	Water Sheds
Pedological Research	Organic Fertilizer	Engineering Design	Land Management and Service	Monitoring		
	Minor Elements					
	Statistical Analysis					
	Fertilization Policy					

Soil Research Centers

Source: Soils Directorate, MAAR.

However, adding the wage bill of SL 11,477,000 to development expenditure, total expenditure allocation to agricultural research in 1983 would have amounted to SL 28.9 million, forming 0.19 percent of Gross Agricultural Product, and 0.04 percent of GDP.

As no time series is available in sufficient detail, it is estimated that annual allocation to agricultural research for the period 1976-80 has ranged between SL 3 and 6 million, and jumped to SL 17 to 18 million for the period 1981-82. As will be discussed later, the heavier load in food crops research has continuously contributed to such increase in budget and expenditure.

2.4 Staff

For the agricultural research system as a whole, data are available only for the total number of research workers or scientists. Total number of supporting staff for all the research institutions is not known.

By the end of 1983, about 500 research workers engaged in agricultural research in the organizations shown in Table 2.3. More detailed information is available for SARD and to a lesser degree for SD.

Out of the 250 researchers employed by SARD, 46 are taking up administrative responsibilities, like chief or deputy of sections and centers, in addition to their research duties. Researchers in SARD are assisted by 60 technicians and 205 supporting staff are engaged in clerical and farm jobs.

The present ranking system involves only office titles like the director, deputy, chiefs of 6 central sections and 28 departments and 17 field centers and stations. The system does not

Table 2.3 Agriculture Research Workers by Organization in 1983

Organization	PhD	MS	BSc	Total
SARD	24	9	217	250
SD	11	1	157	169
CB	2	-	32	34
GADEB	1	-	5	6
GOT	2	-	17	19
GOS	-	-	10	10
Others	4	-	10	14
Total	44	10	444	498

recognize research seniority ranking such as senior research officer, research associate, etc.

Out of 217 scientists at the BSc level, there are 58 females, i.e. 27 percent. Scientists with higher degrees, PhD and MS, are all males. In general, females occupy 23 percent of all posts of SARD, most of them working in the Head Office and Jeblah Research Center.

Although, as will be seen later, SARD is short of expertise in many areas, foreign involvement in agricultural research is hardly felt. In fact, only three expatriates are presently working with SARD. In Jeblah Center, an FAO Specialist is helping in controlling citrus diseases. Apples and food technology are the areas for which two Japanese volunteers are rendering some assistance.

SARD staff has until recently been subject to change and depletion. The following statement depicts the situation: At SARD the appointment dates of 2 scientists go back to 1965; 18 go back to 1970; 41 go back go 1975; and 158 go back to 1980. Since 1980, the personnel situation started to stabilize. The number is steadily increasing, hitting a figure of 250 at present.

Scientists at the Head Office are allocated to research fields as follows: field crops, 42; horticulture (fruit trees and vegetables), 22; plant protection, 34; animal production, 13; food technology, 6; and green house, 3.

In SD, out of 169 scientists, 16 spend some of their time in administrative work. They are assisted by 15 technicians with diplomas and 30 permanent workers in secretarial and field jobs. No expatriates are working in SD.

2.5 External influence

The agricultural research system, especially SARD, has so far established bilateral relations with only two countries, namely Canada and France.

Canada provides an annual grant of $60,000 to help support a variety of research, e.g., cropping intensification, rainfed crop rotation, dynamics of soil moisture conservation, and development of drought-resistant cereal and food legume varieties. Such a grant has reportedly given a positive yield and is expected to continue in light of the long-term nature of this type of research. Through a joint cooperative program, France offers consultation in the citrus area for an annual period of 15 to 20 days.

On the multilateral side, SARD cooperates actively and systematically with three international parties and one regional. SARD currently implements with FAO a citrus disease control

project with a total cost of $100,000. It involves the provision of an expert and a vehicle.

CIMMYT has a long-time presence in Syria. It is still active in providing NARS with maize germplasm, and indirectly through ICARDA, wheat germplasm; periodical consultation, two to three times a year, for the purpose of reviewing and assessing the national cereal breeding program; field and technical equipment; and training courses at the rate of one person a year in the area of wheat and maize breeding.

Cooperation with ICARDA started modestly in 1977, the year it was established in Aleppo, Syria. Joint trials in farmers' fields were set out in 1978. Then, as of 1981, a joint collaborative program was initiated, whereby ICARDA contributed three vehicles of different size and use; seeds for the trials and germplasm for the breeding program; assistance in experimental design and analysis, and in writing the final report; and financial support in the form of rewards to the participants in the program implementation and half the wage bill of the trials affected after the planting stage. All field work involved is done at the SARD research centers and stations.

ACSAD, an Arab League regional center, is exercising, by virtue of its location in Damascus (on the same compound with SARD and SD), a persistent influence on NARS via its training courses, publications, consultation and exchange of expertise. The ACSAD contribution is featured mainly in areas which fall outside ICARDA's areas of interest (see section 2.1).

2.6 Effectiveness and problems

Problems and obstacles faced by scientific research in Syria are imposing certain limitations on the achievements and effectiveness of agricultural research. Therefore it might be advisable to lay down those limitations before coming to the

achievements. Since SARD is the largest and most important research organization within the system, its problems represent those facing NARS in general.

The acute shortage of scientists qualified and capable of efficient leadership of research work is one of the most serious limitations. For instance, none of the following basic specializations is available to SARD at present: all branches of plant breeding; all branches of animal breeding; bacteriology and nematology; plant nutrition; animal feeding; and forestry.

In addition, SARD is complaining about the large number of unqualified new graduates who are badly in need of academic training to become effective scientists. In comparison to the 24 PhD and 9 MS holders, there are 217 research workers who hold only BSc in General Agriculture, of whom only 13 percent have scientific research qualification, and 30 percent have more than 4 years of research experience.

The number of SARD research centers, and hence the area of land available for research projects, has recently substantially increased. More equipment, vehicles, books and scientific publications have become available to the researchers. Nevertheless, these facilities are still insufficient to meet the rapidly increasing research tasks advanced by pressing agricultural development requirements.

Other problems may be classified under the heading of organization, management and finance. The need is strongly felt for more flexibility in the procurement procedures, for more authority to be released by the Ministry to SARD, and for more employment stability, particularly for the technical staff.

SARD has received a big push from the Third Five Year Development Plan 1976-80. A research center development project has substantially contributed to strengthening research stations

and laboratories and to increasing their workload. The number of research projects implemented by SARD has increased during the period 1976-83 from 150 to 200, and jumped in 1984 to 343 research projects, involving 859 experiments in the various research centers and stations. SARD has published 98 research reports, in addition to an unspecified number of field crops research publications as detailed in Table 2.4.

Table 2.4 Research Projects, Experiments and Publications by Topic in 1984

Topics	Research Projects	Experiments	Publications
Field Crops	250	628	—[1]
Vegetables	18	48	26
Fruit Trees	25	99	36
Plant Protection	24	57	16
Food Processing	11	15	10
Animal Production	15	12	10
Total	343	859	98

1 Unspecified

3 Impact of IARCs on the NARS

3.1 General issues

Aside from ICARDA and CIMMYT, NARS is maintaining only a nominal and symbolic type of relation with the following IARCs: CIP, IBPGR, ISNAR, and IFPRI. The contact is limited to the theoretical spheres where NARS used to receive some visitors and publications from time to time. Impact is remaining in "the probable margin," which means that impact may or may not be produced.

Under Syrian circumstances, IARCs impact, especially of ICARDA and CIMMYT, on the NARS is affected by six major factors, featured by NARS in particular: (1) availability of qualified scientists; (2) organizational framework and management aptitude; (3) financial resources; (4) communication and connection; (5) matching and performance standard; and (6) language barrier. The nature of the first three factors has previously been described under 2.3, 2.4 and 2.6. Here something may be said about how they affect the impact.

<u>Availability of qualified scientists</u>

The chronic imbalance between the very small number of properly qualified scientists and the large number of agricultural graduate researchers impedes the process of ideas and technique transfers. Building up research capacity is made more difficult. The situation cannot be corrected by short training courses, oriented mainly to tackle certain practical problems. A large-scale program of formal postgraduate education is imperative. Expanding the type of cooperation presently going on between ICARDA and Aleppo University in the area of MS and PhD program supervision might be the answer.

<u>Organizational framework and management aptitude</u>

Present collaborative research programs between IARC and

NARS could be more successfully implemented if SARD employed more authority and flexibility in carrying out its affairs. Personnel movement and land allocation would have been done as quickly as required by the situation. The need for implementing an incentive regime, whereby good scientists are attracted and motivated, is stronly felt. The repeated call for shifting SARD and SD into a semi-autonomous body might be the right solution.

Financial resources

Budget allocation has been smoothly responding to the present research program execution. However, requirements of building up research capacity such as incentives, books and publications, meetings and conferences, and research expansion would necessitate more funds to be appropriated.

Communication and connection

Since ICARDA is located in Syria, it is the only IARC which would be expected to have potentially long-run impact on NARS. For this reason, ICARDA is maintaining a special type of communication and connection with the three research Directorates of MAAR, namely, SARD, SD, and Steppe, Rangeland and Sheep Directorate. "A Collaborative Research and Training Program" was agreed upon by ICARDA and MAAR in November 1981. Program implementation started the same season 1981-82. It covers three areas of cooperation: joint research in the field of cereals, food legumes, and forage crops improvement; provision of genetic resources; and training of Syrian research workers.

The Collaborative Program runs parallel to ICARDA's main research program. The complementarity of the two programs is not clearly shown in their annual reports. It is, in fact, hard to trace some sort of relation between them. The systematic approach of the main research program design based on the actual problem of local farming is not reflected in the Collaborative Program. In view of its modest research capacity, NARS seems unable at the moment to thoroughly participate in most ICARDA

programs. This has to be added to the fact that ICARDA, although situated in Syria, has international and regional responsibilities. It is fully understood and justified, hence, why ICARDA is assigning higher priority to strengthening NARS research capacity through (1) actual participation with the local staff in carrying out the experiments, follow-up, and analysis of results; (2) multidiscipline, multiperiod training courses; (3) a stream of information in various forms of publications; and (4) technical and financial support.

Matching performance standard

In many instances, ICARDA represents an island of modernization and efficiency in research technique and management. The surrounding environment is lacking a lot of these two elements. The mere feeling of the big difference in performance levels produces a retarding effect on the process of making the impact. A minimum level of compatability between the two systems, the one which produces the impact and that which receives it, is certainly required.

Language barrier

Making the impact is a two-way avenue, the language being the vehicle which transports ideas, techniques and information. ICARDA has solved the language question by employing people who speak the language. However, the fulll utilization of the services of such IARCs as ISNAR and IFPRI is handicapped partially by the language barrier. Except for instances of a couple of high-ranking officials receiving visitors from ISNAR, these two centers are hardly heard of by many key policy-making officers.

3.2 Biological materials

Under the MAAR-ICARDA Collaborative Program, the number of joint experiments has increased from 231 in 1981-82 to 310 experiments in 1983-84, as detailed in Table 3.1 Experimentation

is done at 14 MAAR research centers, all over the country. More than 90 research workers are participating in the program.

Table 3.1 Joint Experiments in the MAAR-ICARDA Collaborative Program

Activity	1981/82	1983/84
Cereals	152	160
Food Legumes	48	105
Forages and Pasture	31	45
Total	231	310

Since it is impossible to enumerate the vast number of varieties and lines involved in the program, the amount of work in the development of crop varieties in 1982/83 will be examined.

Cereals

The improvement program of durum and bread wheat and barley featured 46 field research projects.

Durum Wheat

Crossing blocks: 150 advanced varieties and lines grown out, were the subject of 152 crossings to obtain high-yielding varieties, resistant to drought and widespread diseases and insects.

Segregating population: 265 F1 crossing lines of the previous season crossings were planted.

Preliminary yield trials: 48 varieties and lines were tested.

Advanced yield trials: 24 varieties and lines were tested.

Elite yield trials: 48 varieties and lines were compared.

Regional yield trials: 48 promising varieties and lines were compared.

Bread Wheat

Crossing blocks: 150 advanced varieties and lines were grown out to make 102 crossings.
Segregating populations: 109 F1 crossing lines, and 150 F2 varieties were grown out.
Yield trials: 48 promising varieties and lines were tested.

Barley

Crossing lines: 460 advanced varieties and lines were planted.
Segregating population: 220 F1 crossing lines, 150 F2 crossing lines, and 123 F3 varieties were planted.
Observational nursery: 350 promising varieties and lines were grown out for drought resistant testing. More than 350 varieties and lines were tested for cold resistance.
Initial yield trials: 25 promising varieties and lines were compared.
Other yield trials: 72 varieties and lines were planted.

Food Legumes

Improvement program of faba bean, lentil, and chickpea fostered 37 field research projects.

Faba bean

Observation nursery: 42 varieties and lines of large and middle-sized seeds were planted.
Regional yield trial: 24 varieties and lines of irrigated large seeds, and 16 varieties and lines of rainfed, drought resistant seeds were tested.

Lentil

Observation nursery: Three collections of lentils were planted; 105 small seed varieties and lines; 53 large seed

varieties and lines; 79 long-stem varieties and lines.
Regional yield trials: 24 small seed and 24 large seed varieties and lines were tested.

Chickpea

Observation nursery: 51 varieties and lines were tested for resistance to Ascochyta blight, a country-widespread disease.
International yield trials: 12 winter and 26 spring varieties and lines were grown out.

If CIMMYT's and IBPGR's valuable efforts in providing germplasm are considered, one can rightly agree with the predominant opinion that in the field of biological material, IARCs are making their best contribution to NARS.

3.3 Research methods and organization

In attempting to find out production technologies most appropriate to handle farmers' problems, ICARDA is successfully following CIMMYT's three-stage approach to research design, namely, diagnosis, planning and experimentation. However, such logical procedure has not yet been transmitted to NARS, or even to the style of the Collaborative Research and Training Program (CRTP), referred to earlier. The program features the conventional style of variety and practice trials, being repeated by MAAR since the late fifties. Undoubtedly, the absence of agricultural economists, and the severe scarcity of biological scientists helps in blocking the transmission process of ideas and techniques.

Through the implementation of the Collaborative Program, contact with ICARDA has seemingly led to a traceable effect on research aptitude and methods, but not to the extent that would make a radical change in research philosophy and methodology.

The contact with ICARDA, and with CIMMYT before, has produced an impact on the place of field crops in the overall research structure. It is reflected in the number of field crops research projects, the reorganization of the Field Crops Section of SARD, and hence the budget allocation to agricultural research.

During the period 1978-84, while the number of SARD research projects in the area of field crops, which is the area of IARCs' interest, has increased more than four times, the number of research projects in other areas of SARD concern has almost remained at a standstill, as depicted in Table 3.2.

Table 3.2 Number of SARD Research Projects in Syria 1978-84

Activity	1978	1979	1980	1981	1982	1983	1984
Field Crops	61	82	89	101	118	124	250
Vegetables	22	35	24	30	23	6	18
Fruit Trees	38	38	30	21	22	24	24
Plant Protection	13	15	18	15	19	17	25
Food Technology	10	7	11	11	11	12	11
Animal Production	--	12	8	7	7	6	15
Total	144	189	180	185	200	189	343

Within the Field Crops Section of SARD, a department for forage crops research was created in 1980, and one for farm practices in 1981. This has reportedly happened following the training of people in these fields by ICARDA.

The presence of ICARDA is again felt in the increasing attention being given to SARD and SD research programs to

research rainfed field crops. Fertilization, weed control and other improved farm practices are being heavily tested under dry-farm conditions.

3.4 Information and training

Since the late fifties, CIMMYT has regularly offered training opportunities, at the rate of one trainee a year, for a full- year period. The topic of training is wheat and maize alternately.

By virtue of its location, ICARDA is providing a greater number of training opportunities. Annually since 1978, 7 to 11 trainees have attended ICARDA's 6-month training courses. In addition, various types and numbers of short courses are arranged every year. A total of 65 people participated in ICARDA courses in the 1982/83 season, a number which increased to 80 in the 1983/84 season as shown in Table 3.3.

Considering that short courses in most cases take only a few days, long courses remain the major component of the training program. The annual number of long-course trainees constitutes about 4 percent of the present number of SARD research workers and only 2 percent of the total NARS research staff.

About 93 people are benefiting from the continuous training courses through their participation with ICARDA experts in carrying out the MAAR-ICARDA Collaborative Research Programs.

ICARDA cooperates with the Faculty of Agriculture, Aleppo University, in granting PhD and MS degrees. It assists in supervising thesis preparation and research projects and providing field, transport and printing facilities. About eight participants are involved in the program.

Table 3.3 Participants in ICARDA Training Courses

Training Courses	1982/83	1983/84
Long courses	10	8
National short courses	17	19
International short courses	7	18
Specialized short courses	30	31
Individual short courses	1	4
Total	65	80

It is generally agreed that training is one of the most important services provided by IARCs. While these services are highly valued in building the national research capacity, it is believed that what is being offered is much less than what is required. All other factors come after training in building such capacity and their effects depend on the availability of the trained research worker.

Of course, ICARDA cannot be asked to meet all NARS's research training requirements. However, in view of the IARCs' resources and organization, efforts can be intensified to enhance training activities. International help in providing post-graduate, formal education is urgently needed.

It is also generally agreed that conferences, meetings and seminars are ICARDA's very important contribution, and highly valued by research people and policy-formulating officers. An increase in the number of meetings is warmly welcomed.

3.5 Relationships between IARCs and NARS

An annual meeting is held between representatives of MAAR and ICARDA to review the implementation progress of the Collaborative Research and Training Program. This annual gathering provides a unique chance for the two parties to discuss each other's research needs. It is not clear, however, that this opportunity is maximized, particularly by the Syrian party which needs to express its research priorities in hopes that they will be reflected in ICARDA programs.

SARD officials feel that IARCs should emphasize study and improvment of local varieties, especially of wheat and barley, as well as foreign varieties. The local wheat variety, Horani, still gives the best performance under drier conditions which prevail in two-thirds of the wheat areas.

A similar position is taken by the Steppe and Rangeland officials. They feel that ICARDA should respond to the claim that rangeland improvement trials should be carried out in the natural, representative environment, i.e., area with less than 200 mm of rainfall. Instead of concentrating its activities in the high rainfall area, ICARDA should move to the dry and semi-arid zone where the soil and the vegetation cover is subject to severe erosion and deterioration.

The question, of course, is not how valid the points are. The implication is that a proper mechanism to assess them should be sought.

4 Research Impact on Agricultural Production

Of the crops with which IARCs deal, discussion here is limited to those crops for which emphasis is given by NARS. They are five crops: wheat, barley, maize, chickpea and lentil. Only wheat research has released new varieties and yielded production effects in Syria. Research in the other four crops is still in the various stages of the pipeline.

4.1 Production and other effects

For the 1971/72 season, the Syrian government, MAAR, imported 5,160 metric tons of six Mexican HYVs of bread wheat. Two of them, Mexipak 65 and Siete Cerros are still in use. The other four, including Inia, Pitic, Lerma Rojo and Penjamo 60, are not planted anymore because of undesirable seed quality. During 1972/73, 50 tons of Jori 69C were imported, and the variety is still grown.

In 1972, Syrian authorities approved a new HYV of durum wheat. Gezira 17 was selected by a SARD technician from an Italian variety called Alexi. The Seeds Multiplication Authority distributed Gezira 17 seeds to farmers in 1977. This variety yields 25 percent more than Jori 69C. Although still in wide use, Gezira 17 is becoming susceptible to disease.

As of the early 1970s, the cultivation of HYVs has made a revolution in the wheat farming in Syria. Two developments have been featured:

1. The rise of production has hit new records. The overall average of wheat yield has increased from 750 kg per ha to 1,150 kg. Average total production has risen from 930,000 metric tons (average 1967-73) to 1,670,000 tons (average 1974-83).

2. Stability of long term production has been realized. The ratio of maximum-minimum difference to average has dropped from 130 percent to 55 percent (same periods).

These two developments were made possible due to the fact that wheat HYVs respond well to optimum irrigation and fertilization. Irrigated wheat farming has since been widely practiced in the area of the Euphrates and Khabour rivers, as a part of new cropping patterns of cotton-wheat, replacing an old one of cotton-fallow. The operation of irrigation equipment (water lifting machines) and the expenditure for fuel and other costs of winter wheat production have therefore become economical. Total area of irrigated wheat has increased from 83,000 ha (average 1967-73) to 173,000 ha (average 1974-83).

Under the improved seeds policy of producing one-third of the total wheat seed requirement annually, production of improved, certified HYV wheat seed has risen from 23,551 tons in 1982 to 47,700 tons in 1984, as detailed in Table 4.1.

Table 4.1 Amount of Certified Wheat Seed Produced

	1982		1983		1984	
Variety	Tons	Percent	Tons	Percent	Tons	Percent
Durum						
Gezira 17	2,051	8.7	4,482	14.3	6,800	14.3
Jori 69C	4,034	17.1	5,268	16.8	7,700	16.1
Bread						
Ciete Cerros	3,688	15.7	4,006	12.8	6,600	13.8
Mexipak	13,778	58.5	17,642	56.2	26,600	55.8
Total	23,551	100.0	31,398	100.0	47,700	100.0

Up to the early 1980s, cultivation of wheat HYVs increased amazingly, occupying more than 600,000 ha (45 percent of total wheat area), and producing 1,300,000 tons (about 60 percent of total wheat production).

The introduction and spread of wheat HYVs into the rainfed and irrigated cropping systems have undoubtedly produced deep and long-lasting effects in the rural structure. In the absence of relevant research and studies, it is difficult to quantify these effects and to trace them area and time wise. However, observation strongly indicates that the growing of wheat HYVs under irrigation along with cotton and/or sugarbeet has led to a higher, multisource, and multiseason farmer's income. The increase in wheat yield in the rainfed areas has contributed to higher net return, and hence to a stronger tie between the farmer and the land.

Wheat HYVs growers constitute an important segment of the farming community; their number is estimated at 80,000, about 20 percent of total landholders in the country. They cultivate 130,000 ha of irrigated land and about 500,000 ha of rainfed land with wheat HYVs. The irrigated area of HYV wheat comes to 76 percent of cotton area, the first national cash crop, 94 percent of irrigated vegetable area, and 48 percent of sugarbeet area.

4.2 Innovations with potential impact

As of 1981, SARD, ICARDA and ACSAD have been announcing the release or development of new, better performing varieties for wheat, barley, maize and chickpea.

Wheat

In 1982, the Variety Release Committee approved two new wheat cultivars developed by SARD, Bhouth 1, a durum, and Bhouth 2, a breadwheat. Seeds of both varieties are expected to be distributed to farmers in 1986.

Bhouth 1 is a seemingly natural mutant, selected from a localized variety called Senator Capilli. The new variety plants are distinguished by shorter stem and larger ear. Bhouth yields up to 7 to 54 percent more than Gezira 17, depending on the amount of soil moisture.

Bhouth 2 ([SZZ7 x up 302] x E4843-2jit62L [Duma S-685]) was selected from CIMMYT's breeding lines. It yields up to 34 to 53 percent more than Mexipak. Later, during seed multiplication, segregation features appeared in some fields. Multiplication has been stopped until appropriate tests are made.

In 1983, the Committee approved two other new wheat cultivars, Sham 1, a durum, and Sham 2, a breadwheat; developed by ICARDA and tested by SARD. Seeds are expected for distribution in 1987.

Sham 1 (PLC'S' - Ruff'S' x GLa 'S' Rtte and CM1 7904 - B - 3M - 1414 - Osk [WAHA]) yields up to 5 to 14 percent more than Gezira 17, depending on soil moisture.

Sham 2 (7C - Tob/CNO - Kal [Ciete Cerros]) yields up to 18 percent more than Mexipak under irrigation.

Other varieties once declared promising include SAHL (Cr 'S' x T. dic. V. Vernum GU'S' and CM 199-29M-14-1M-OY Dalg), a durum, and golan (S 311 - Nortino) and Bloudan (H D 2172), breadwheat adopted by ICARDA, and ACSAD 65, developed by ACSAD.

Barley

After being approved for multiplication and distribution to farmers, the barley variety Beecher has proved to be intolerant to cold and drought conditions. It performs well only in the warm, rainy areas. Since barley is grown mainly in the drier, colder areas, Beecher multiplication has been stopped. ICARDA research in 1982/83 has confirmed promising new lines, BR/Apam and Badia (Beacher - 2762 - 6L) for zone B (250-350 mm rainfall), and WI 2269 and Harmal for zone C (250 mm). Under the SARD

research program, new promising cultivars include Furat 171 (Briggs) and Furat 1113 (Fun / H45 // PI 3604 / Fun /3/Avt/Nor/ B2 Winn /4/Cer/2*pro-6L), yielding 14 to 36 percent more than the local variety Arabi Abiad. ACSAD has announced the release of one promising barley cultivar called ACSAD 176.

Maize

A new maize variety given the name "Ghouta 82," is being multiplied for distribution to farmers in the near future. Ghouta 82 goes back to Agaiti 72, introduced in 1974 from Pakistan under an FAO regional project, and subjected to severe mass selection and other breeding techniques. Ghouta 82 yields 18 percent more than the French hybrid LG 11, and at least 60 percent more yield than the national average.

Three promising maize hybrids are in the pipeline. Sham 27, Sham 29 and Sham 7 give better yield, and mature earlier, than LG 11, early maturity being a limiting factor.

Chickpea

One chickpea cultivar named Izra (ILC482), developed at ICARDA and tested by SARD, has been released for winter planting. This HYV has a long stem, an advantage for mechanical harvesting, is resistant to Ascochyta blight and tolerant to cold. It yields at least 3 t/ha, which is double the national average of irrigated chickpea, and 4.5 times that of the rainfed.

However, it recently had a severe incidence of cyst nematode and "therefore its distribution was temporarily postponed for further investigations." A promising new chickpea cultivar ILC 3279, being developed under the MAAR-ICARDA Collaborative Program, is expected to be released in 1985. It has similar traits to ILC 482, but it responds better to higher rainfall and is more tolerant to cold.

Farm practice research projects aimed at improving the productivity of food field crops are plenty. However, it appears that the majority of these projects have not yet given definite

and conclusive results. Few cases exist with results ready for application. Fertilization and weed control of wheat, barley and lentils are examples of wide potentiality.

The use of fertilizers (100 kg N + 60 kg P_2O_5) and herbicides in wheat fields would increase the yield by 1 to 2 tons of grain and 1.25 to 3 tons of straw per hectare. Net return per hectare would increase by SL 1,200. At the national level, fertilization and weed control would help increase total wheat production by 700,000 tons (500,000 ha x 1.4 tons). GNP could be increased by SL 600 million.

In the barley fields, fertilization (20 kg N + 45 kg P_2O_5) and chemical weed control may enhance the yield by 0.35 to 0.74 tons of grain and 0.35 to 0.64 tons of straw per hectare, and net return by SL 100 to 390 per hectare, depending on location. At the national level, total barley production may increase by 200,000 tons (500,000 ha x 0.4 ton) and GNP by SL 80 million.

Fertilization (20 kg N + 60 kg P_2O_5) and weed control twice by hand may double the yield of lentils. A lower increase of 0.5 ton per hectare is assumed. Application on 35,000 hectares would increase national lentil production by 17,500 tons (35 percent of total production).

5 Conclusions

Aside from the direct contribution CIMMYT has been making to increasing wheat production through the HYV strategy, ICARDA is practically the only IARC which is expected to contribute effectively to agricultural production increase in Syria. However, ICARDA's impact is governed by three considerations concerning the short time since ICARDA has been present in Syria. By all measures, a 6-year span is not quite sufficient time to:

1. Produce reliable and applicable research findings, whether about improved new varieties or advanced production techniques.
2. Establish a dependable, long-lasting and trustful relationship with the Syrian research and extension services, which would permit prompt transfer of new knowledge and methods to farmers.
3. Make available the input requirements of the new technologies such as the improved seeds of the newly released varieties, farm machinery (e.g., lentil and chickpea harvester), chemicals, etc. in addition to convincing farmers to adopt the new techniques and obtain the new inputs.

Hence, it is still premature and unfair to talk about ICARDA's impact or effect on production, yield, farmers' income, income distribution, nutrition, etc. As one Syrian senior official has put it: "Increasing production is a complicated, time consuming process. However, within the resources available to ICARDA and its research strategy, we expect positive results in the future." He commented on ICARDA's research strategy as fostering "the real meaning of productivity increase," since it rests on two solid bases. First, it concentrates on two major dry-farming crops: barley and chickpea, which before ICARDA had received little research attention. Second, it emphasizes the volume of research works in production physiology in order to

increase productivity under the really predominant conditions of drought, salinity, cold, insects and diseases.

Within the whole research program, research in farm practices (or systems?) seems to be relatively more promising and less time consuming, especially in the areas of fertilization, seeding rates and dates and weed control. It is well known that rainfed farming is receiving very negligible doses of technology. A concentrated and effective push would result in a substantial increase in crop productivity under rainfed conditions. Therefore, it might be advisable for ICARDA to speed up the process of technology transfer. Research efforts in the past 6 years could best be utilized by going carefully through farm practice research findings, putting them into usable form and forwarding them to the extension service. Informal pressure may be exercised and accompanied by an appropriate information campaign.

On the other hand, IARCs' impact on NARS research capacity could conceivably be strengthened through a number of measures, which may be taken, particularly, by ICARDA:

1. In addition to ICARDA's previous efforts to bring forth the idea of a Research Coordination Committee, ICARDA could help in actual implementation by calling representatives of all research parties to periodic meetings where their research programs would be discussed and coordinated. The annual meeting of the MAAR-ICARDA Collaborative Program could be a good starting occasion, especially if similar programs are concluded with other agencies, particularly GADEB and the Faculty of Agriculture, Aleppo University. An expanded meeting to discuss all collaborative programs in one cycle of sessions would be a practical move toward actual coordination. In fact, there is an urgent need to support the research capacity of those two institutions in

a way similar to the coordination with MAAR's three directorates.

2. More than cooperation, the participation of the Aleppo Faculty of Agriculture in ICARDA's research program needs to be stressed. By getting faculty professors more involved in the implementation of the MAAR-ICARDA Collaborative Program, ICARDA would play a catalytic role between Syrian research parties, and strengthen the relationship between the faculty, SARD and SD.

3. In view of the utmost importance of the ICARDA/Aleppo Faculty of Agriculture postgraduate study program, a thorough program assessment should be made, after which a decision to expand it could be taken. If the program expansion becomes practical and successful, more NARS researchers could be enrolled to get an academic research degree. A feasible scheme to finance and organize the expanded program should be worked out.

4. The proposition currently under consideration to establish an International Translation Center at ICARDA is essential and should be implemented as soon as possible. Basic documents and important publications of such centers as IFPRI, ISNAR and IBPGR would be widely and easily made available. This consequently will facilitate and speed up the utilization of these centers' services.

5. The warm reception of ICARDA's and other IARCs' publications encourages a wider distribution of a large number of small-size, topic-specific publications in Arabic. The largest possible number of MAAR officers, especially those working in SARD, SD and Steppe Directorate should be reached. ICARDA research publications should also reach a wider class of people in the policy-making and services directorates of MAAR (Planning, Agricultural Affairs,

Extension), and the State Planning Commission and the Faculties of Agriculture.

Appendix

Persons Visited

ICARDA Personnel

1. Dr. M. A. Nour, Director General
2. Dr. A. Shuman, Assistant Director General
3. Dr. P. Cooper, Program Leader, Farming System
4 Dr. J. Srivastava, Program Leader, Cereals
5. Dr. M. Saxena, Program Leader, Food Legume Improvement
6. Dr. P. Cocks, Program Leader, Pasture, Forage, and Livestock
7. Mr. L. Chambers, Program Leader, Communication and Documentation
8. Dr. K. Somel, Agricultural Economist, Farming System
9. Dr. S. Ahmed, National Research Coordinator

Syrian Policy Makers

10. Mr. H. Saoud, Deputy Minister, MAAR
11. Mr. N. Mohammed, D. G. Seeds Multiplication
12. Dr. K. Mas'oud, Dean, Faculty of Agriculture, Aleppo University
13. Dr. R. Kanbar, Director, Scientific Agricultural Research Dept., MAAR
14. Dr. J. Abdul Karim, Director, Soils Dept., MAAR
15. Mr. F. Mraiwed, Director, Agricultural Affairs Dept., MAAR
16. Mr. M. S. Ali, Director, Training Dept., MAAR
17. Mr. U. Alloush, Director, Planning and Statistics Dept., MAAR
18. Mr. S. El-A'meri, Director, Agricultural Extension Dept., MAAR
19. Mr. H. As-Samman, Director, Steppe, Pasture and Sheep Dept., MAAR
20. Mr. R. Sa'adud Deen, Director, Irrigation and Agricultural Planning, State Planning Commission

Syrian Agricultural Researchers

21. Dr. R. Hamdan, Deputy Director, SARD, MAAR
22. Mr. K. El Arab, Head, Field Crops, SARD, MAAR
23. Mr. M. El-Ahmad, Head, Plant Protection, SARD, MAAR
24. Mr. F. El-Khouri, Head, Animal Production, SARD, MAAR
25. Mr. S. Shalleh, Head, Vegetables, SARD, MAAR
26. Mr. S. El-Matt, Legume Crops and Oil Seed, SARD, MAAR
27. Mr. A. Zara, Seeds, Disease, SARD, MAAR
28. Mr. K. Obari, Genetic Resources, SARD, MAAR
29. Mr. Y. S'weidan, Forage and Pasture, SARD, MAAR
30. Mr. W. Tawil, Plant Genetic (Mutations), SARD, MAAR
31. Mr. F. Kardoss, Head, Field Crops, Agricultural Affairs Dept., MAAR

References

Ahmed, S. E. and others (1984), "The Role of ICARDA in Strengthening National Agricultural Research Programs in West Asia and North Africa."

Dalrymple, Dana G. (October 1984), "Development and Spread of High-Yielding Varieties of Wheat and Rice in the Less Developed Nations," CGIAR, pp. 25-27.

"ICARDA Annual Reports 1981, 1982, 1983."

"ICARDA in Syria," 2nd edition 1983, Arabic.

MAAR-ICARDA, "Collaborative Research and Training Program," Annual Reports for 1981/82 and 1982/83.

"A Report on the Status of the Scientific Agricultural Research Directorate, Accomplishments, Obstacles and Solution" (1984), Arabic Memo.

ISSN 0257-3148
ISBN 0-8213-0822-X