

010-440-439 52

936411.12

ISSN=86050

# ICARDA

Annual Report for 1985

## EXECUTIVE SUMMARY



INTERNATIONAL CENTER FOR AGRICULTURAL  
RESEARCH IN THE DRY AREAS

Box 5466, Aleppo, Syria.

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<sup>1</sup> Left the Board in 1985

<sup>2</sup> Joined the Board in 1985



### Foreword

*For 1985, as for previous years, ICARDA is preparing a comprehensive annual report which will describe our research work and achievements in considerable detail. However, such reports inevitably take time to produce, and I am conscious that many of ICARDA's associates around the world would wish to have an early but concise statement of our principal activities.*

*In a document of this compass, it would be impossible to mention all our activities. We have had to make a selection to illustrate the main themes. However, if an Executive Summary of this kind proves to meet the immediate needs of those who are interested in the progress of our work, ICARDA will issue similar summaries in future years.*

*Mohamed A. Nour  
Director General*

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# **International Center for Agricultural Research in the Dry Areas**

## **Annual Report for 1985**

### **EXECUTIVE SUMMARY**

The International Center for Agricultural Research in the Dry Areas (ICARDA) was established in 1977. Based at Aleppo, Syria, it is one of thirteen centers supported by the Consultative Group on International Agricultural Research (CGIAR).

The CGIAR seeks to increase agricultural production but, at the same time, to improve social and economic conditions for people living in developing countries; hence it supports the kind of research that will help small farmers, even those with inadequate resources, to achieve better harvests. In setting up ICARDA, the CGIAR was addressing the problems of developing countries in West Asia and North Africa. In fact, ICARDA focuses its efforts on areas having a dry summer and where precipitation in winter ranges from 200 to 600 mm.

In terms of crops, the CGIAR has given to ICARDA a world responsibility for the improvement of barley, lentils and faba beans, and a regional responsibility for the improvement of wheat, chickpeas and pasture and forage crops; it has also supported an important ICARDA program on farming systems.

The results of the research are transferred through ICARDA's cooperation with national and regional research institutions and with Ministries of Agriculture, and through the technical assistance and training that ICARDA provides. These efforts are reinforced by seminars, by publications (research reports, training materials and manuals for the application of techniques), and by the services of specialized information centers operating in close association with ICARDA's senior scientists.

ICARDA aims not merely to complement the work of national research programs, but also to strengthen national research capacities. Progressively, much of the work now carried out at the Center will be handed over to scientists at country level.

## Expenditures and Funding

In 1985, ICARDA spent almost twenty million United States dollars for its various programs and for capital expenses, including those for the building of its permanent headquarters. A summary account is given in Table 1, and the sources of these funds are indicated in Table 2.

In addition, ICARDA received more than two million dollars from six different donors for thirteen special projects.

## Research Locations and Staff

Much of ICARDA's research is carried out at its headquarters at Tel Hadya, 35 km southwest of Aleppo, on a farm of 948 hectares. ICARDA also manages other sites where material can be tested under a

Table 1. Summary account of ICARDA disbursements in 1985 (kUSD)

<b>Research:</b>	
Farming Systems	1 986
Cereals	2 017 *
Food Legumes	1 665
Forage and Livestock	1 451
<b>Research Support:</b>	
Genetic Resources	496
Farm Operations	1 551
Computer	501
Training	402
Communications	846
Cooperation with National Programs	374
Board and Administration	2 255
General Operations	2 439
Capital and Working Capital	3 950
	<hr/>
	19 933

\* Figure includes 77 kUSD for research on crops at high altitudes.

**Table 2. Sources of funds for ICARDA's core program and capital requirements (kUSD)**

Arab Fund	343 *	Italy	1 075 *
Australia	422	Netherlands	343
Canada	662	Norway	283
China	50	OPEC	758 *
Denmark	97	Saudi Arabia	600
Ford Foundation	175	Spain	100
France	127 *	Sweden	364
Germany (BRD)	668	UNDP <sup>3</sup>	200 *
IBRD (World Bank)	5 250	United Kingdom	622
IDRC <sup>1</sup>	249 *	USAID <sup>4</sup>	5 460 *
IFAD <sup>2</sup>	500 *	Earned income	1 585
			19 933

\* Part or all of these amounts were provided for specified activities or capital requirements.

<sup>1</sup> International Development Research Centre, Canada

<sup>2</sup> International Fund for Agricultural Development

<sup>3</sup> United Nations Development Programme

<sup>4</sup> United States Agency for International Development

variety of agro-ecological conditions: at Kafr Antoon, Jindiress, Khanasser, Breda and Lattakia in Syria, and at Terbol in the Bekaa valley of Lebanon. However, the full scope of ICARDA's activities can be appreciated only when account is taken of the cooperative research carried out with many countries of the region. Particularly important activities are under way at various locations in Syria and Jordan, at Quetta in Pakistan, in Tunisia, and with Egypt and the Sudan in the Nile Valley. The 1985 distribution of staff at the various sites is shown in Table 3.

**Table 3. Staff of ICARDA at various locations in 1985.**

	International Professional	Regional Professional	Other Staff
Aleppo - Tel Hadya	45	25	517
Damascus Office	-	-	5
Beirut Office	-	1	7
Amman Office	-	-	1
Cairo Office	1	-	6
Lattakia	1	-	4
Terbol, Lebanon	-	-	21
Quetta, Pakistan	3	-	-
Tunis	3	-	4

## **Farming-Systems Research**

On-farm trials, conducted in cooperation with the Syrian Soils Directorate, have clearly demonstrated that farmers can increase their yields and net revenues by applying fertilizer on unirrigated barley; this advantage is seen even in the drier areas. However, there are variations in the amount of the derived benefit, and these depend on the weather during a particular growing season, the position of the fertilized barley in a crop rotation, and the relative effectiveness of different N and P applications. The economics of a wide range of conditions was established.

Farmers can also increase their profits by incorporating a forage legume in a crop rotation based on barley. The forage legume can either be grazed, or it can be harvested and stored for winter feed. When the legume replaces a year of fallow, sheep flocks may be increased as much as 100% and the farmers' profits as much as 75%.

ICARDA has made extensive studies of the current practices of wheat-growing farmers in Syria, particularly to see what judgements they exercise in applying fertilizers and herbicides. It is clear that farmers take account of rainfall and of the previous crops in making their decisions. The surveys covered many other variables, including tillage practices, seeding rates, preferred varieties and straw-disposal methods. It was also determined how farmers decide when to use herbicides and when to resort to hand-weeding to provide feed for animals.

Other studies during the year included those on the value of a limited amount of irrigation to supplement winter rainfall, on the long-term retention of applied phosphorus in the soil, and on how tillage practices affect run-off and erosion. Many of the different variables were introduced into a wheat-growth-simulation model (SIMTAG) in an effort to determine their interrelationships. The purpose is to arrive at generalizations that are likely to apply over a wide geographic area.

## **Cereals Research**

Algeria, Chile, China, Cyprus, Ecuador, Egypt, Iran, Jordan, Lebanon, Libya, Mexico, Morocco, Pakistan, Portugal, Spain, Sudan, Syria, Thailand, Tunisia and Turkey have identified barley and wheat cultivars from ICARDA germplasm for large-scale on-farm testing, seed multiplication and possible release.

Earlier such tests led to the actual release of three barley varieties in Tunisia. ICARDA places emphasis on the development of barley for areas with less than 300 mm of precipitation. Advanced breeding techniques were used to hasten the stabilization of desired characteristics and to gain access to the variability available in land-races and *Hordeum spontaneum*. This research also seeks to comprehend the physiological factors that influence a plant's ability to resist different types of stress.

For both durum and bread wheat, ICARDA works with CIMMYT to upgrade the level of resistance to the biotic and abiotic stresses that prevail in West Asia and North Africa. The objective is to maintain a reasonable yield in poor years, but to take full advantage of good years. Crosses between locally-adapted land-races and high-yielding varieties show evidence of combining desirable traits from both sources.

Two particularly interesting durum wheats were identified: these show tolerance to cold and resistance to yellow rust, and they give yields of about 3 500 kg/ha. The frost-tolerance and high-protein characteristics of wild emmer have been transferred into durum wheat. Two disease-resistant bread wheats have been identified which yield over 4 000 kg/ha in the cold, high-altitude regions of Pakistan and Morocco.

### Food-Legume Research

ICARDA supplies national research teams with improved lines of faba beans, kabuli chickpeas and lentils. Syria has started on-farm trials of ICARDA lines for all three crops; Turkey is doing so for chickpeas and lentils; Egypt and Morocco for chickpeas; and Pakistan for lentils. In Ethiopia a lentil cultivar has been released to farmers, and a chickpea cultivar has been released in Cyprus.

Lentil production has fallen in West Asia because of the high cost of harvesting by hand. ICARDA has designed mechanical-harvesting techniques that can be best applied when non-lodging cultivars are sown on unridged soil. The harvesters are pulled by tractors and employ a cutter bar with angled blades. Syrian researchers are now testing these machines on farms.

Throughout the ICARDA region, faba-bean production is affected by various diseases, of which the most important are chocolate spot and *Ascochyta* blight. Durable resistance to chocolate spot has been found

in lines tested in Egypt, the Netherlands, Syria and the United Kingdom. Similar resistance to *Ascochyta* blight has been found in lines tested in Canada, Syria and the United Kingdom. ICARDA is now incorporating these qualities into local varieties. More recently, new sources of chocolate-spot resistance have been found in genetic material from Ecuador.

During the winter of 1984/85, ICARDA was testing 10 000 chickpea lines. Since this winter proved to be unusually cold, it provided the opportunity to identify several lines with exceptional cold-tolerance characteristics.

### Pastures, Forage and Livestock Research

A survey in western Syria identified the naturally occurring medic species and their habitats. One of these, *Medicago rigidula*, which is tolerant of frost, has been studied in pasture/cereal rotations managed by farmers at the village of Tah. The land proves to be as profitable in the pasture year as it is in the cereal year, and enough of the medic seeds survive the cereal year so that the land does not need to be re-seeded to establish the pasture again.

Vetches are also interesting for use in rotation with cereals, and work was concentrated on selection and breeding. Some vetches have been identified that have wide adaptability: they are resistant to root-knot nematode, to several foliar diseases and to frost, yet they also produce a large yield of herbage and seed. However, work with forage peas, *Pisum sativum*, led to disappointing results: sheep found them unpalatable and lost weight when no other feed was available.

In the ICARDA region, there are vast areas of marginal land used only for grazing. When superphosphate is applied to such lands, there is a marked increase in plant growth, and preliminary studies suggest that the enhanced animal production will make it profitable for farmers to apply this fertilizer.

Research employing three experimental flocks of sheep sustained at different levels of nutrition has indicated how farmers might increase their economic returns through improved husbandry.

## **Genetic Resources**

Germplasm collections were made in Egypt, Turkey and Pakistan, but more of the effort available was devoted to the evaluation, documentation and conservation of the existing collections. A virology laboratory was established, and a preliminary survey identified the principal viruses infecting food legumes and cereals in four countries of the region. ICARDA continues to monitor all the seed it receives and distributes to ensure freedom from pathogens.

## **Computer**

ICARDA's in-house computer not only handles the work of the Center, but also many of the needs of Syria's national agricultural research program. Commercially-available software is used where appropriate, but ICARDA has also developed packages that respond directly to its needs and that can be maintained locally. CRISP is such a package for experiment design and statistical analysis; ICADET for database management; and MAS for management and accounting. CRISP and ICADET are now also used at some other CGIAR centers that have VAX computers and at a few institutions of higher learning in the region.

## **Training**

ICARDA sees training as a necessary complement to research and as one of the essential mechanisms for transferring the results of research to the scientists and change-agents in the national institutions of the region. In 1985 ICARDA managed three long-term residential training courses at Aleppo. Six short courses were held, two at ICARDA headquarters, two in Morocco, one in Pakistan and one in Syria. A total of 225 individuals were registered for these or other more-intensive individual training programs.

## **Communications**

A large-capacity offset printer was brought into operation, permitting ICARDA to produce many of its publications in-house. Of the 77 produced in 1985, eleven were in Arabic. The information centers on lentils and faba beans expanded their activities, and the information

center on cereals launched an Arabic version of its newsletter. Mailing lists were computerized. The Library, which has very small collections as compared with most other CGIAR centers, made a modest increase to its rate of acquiring books and periodicals.

### **International Cooperation and Special Projects**

In a summary such as this, it is not possible to mention all the joint activities carried out with research institutions in the ICARDA region, nor to give specific recognition to our many research collaborators in Europe and North America. ICARDA conducts many Special Projects that are accorded specific funding by donors, and it does so either with its own resources, or in partnership with others. Here we present only the larger of these activities.

The Nile Valley project, financed by the International Fund for Agricultural Development, has been in operation for more than six years. Originally the project involved Egypt and the Sudan, but Ethiopia formally joined in 1985. Research conducted by national collaborators, both in research stations and on the farmers' own fields, has demonstrated methods for increasing faba-bean production by up to 100% and with enhanced profits for the farmers. The parasitic weed, orobanche, can be almost completely controlled.

The OPEC Special Fund has allocated resources for a new project, applying similar management and research techniques, to enhance the production of wheat in the Sudan. It is expected that the success of the Nile Valley project will lead to a continuing program on several crops in all three countries.

A cooperative program in Tunisia, partly supported by the International Development Research Centre of Canada, has also accomplished five years of work. ICARDA cooperates with its Tunisian counterparts in research programs involving cereals, food legumes and farming systems.

ICARDA has a multitude of cooperative arrangements with its host country, Syria. The fourth annual coordination meeting took place in October 1985 in the presence of His Excellency, the Minister of Agriculture and Agrarian Reform. Syrian national research organizations now manage most of the field-trial programs carried out in their country.

A special project, financed by the Netherlands and the Federal Republic of Germany, has placed a seed technologist at ICARDA who will help national seed-production organizations to enhance their processes and deliver tested seeds of improved varieties.

Another special project, set up under a four-year contract with the United States Agency for International Development, aims at improving technologies and producing plant material adapted to the harsh environment of western Pakistan. ICARDA scientists have established a unit with the Arid Zone Research Institute at Quetta, and they are working with AZRI scientists to assist farmers in the high plateaux of Baluchistan. The research covers most of the topics relevant to the area including cereals, food legumes, pasture development, range management and livestock improvement.

### **Permanent Buildings**

Progress in the construction of the permanent headquarters at Tel Hadya enabled ICARDA to set a date in May 1987 for their official inauguration, an occasion that will coincide with ICARDA's Tenth Anniversary.

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