

# NETHERLANDS CARD

## The Netherlands and ICARDA

Ties that Bind



International Center for Agricultural Research  
in the Dry Areas

## About ICARDA and the CGIAR



Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is one of 15 centers supported by the CGIAR. ICARDA's mission is to improve the welfare of poor people through research and training in dry areas of the developing world, by increasing the production, productivity and nutritional quality of food, while preserving and enhancing the natural resource base.

ICARDA serves the entire developing world for the improvement of lentil, barley and faba bean; all dry-area developing countries for the improvement of on-farm water-use efficiency, rangeland and small-ruminant production; and the Central and West Asia and North Africa (CWANA) region for the improvement of bread and durum wheats, chickpea, pasture and forage legumes, and farming systems. ICARDA's research provides global benefits of poverty alleviation through productivity improvements integrated with sustainable natural-resource management practices. ICARDA meets this challenge through research, training, and dissemination of information in partnership with the national, regional and international agricultural research and development systems.



The Consultative Group on International Agricultural Research (CGIAR) is a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural Centers that work with national agricultural research systems and civil society organizations including the private sector. The alliance mobilizes agricultural science to reduce poverty, foster human well being, promote agricultural growth and protect the environment. The CGIAR generates global public goods that are available to all.

The World Bank, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), and the International Fund for Agricultural Development (IFAD) are cosponsors of the CGIAR. The World Bank provides the CGIAR with a System Office in Washington, DC. A Science Council, with its Secretariat at FAO in Rome, assists the System in the development of its research program.

# **The Netherlands and ICARDA**

Ties that Bind  
No. 4



International Center for Agricultural Research  
in the Dry Areas (ICARDA)

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## INTRODUCTION

The Netherlands is one of the few developed countries that have been consistent in supporting development cooperation at levels agreed by the UN and OECD. Every year the country allocates 0.8% of its GNP to poverty reduction programs around the world, and the current focus of its aid policy is to help developing countries achieve the Millennium Development Goals.

A member of the Consultative Group on International Agricultural Research (CGIAR) since 1971, the Netherlands has been a regular donor to agricultural research worldwide and has supported ICARDA since its establishment in 1977. Through the International Agricultural Center in Wageningen, the country has contributed to strengthening national agricultural research systems (NARS) and regional organizations through support for regional fora on agricultural research, research activities, linkages between research and development activities, participation and partnerships, and the development of effective information systems.

One of the top 10 donors to ICARDA, the Netherlands contributed over one million US dollars to the Center's core funding in 2004, in addition to supporting various collaborative research projects of ICARDA and NARS within Central and West Asia and North Africa (CWANA), ICARDA's mandate region, and providing funds for the various CGIAR systemwide initiatives. The Netherlands also contributes to ICARDA's research through support provided by the European Commission. Thus, the net funding support from the Netherlands to ICARDA's activities is quite substantial.

## RESEARCH COLLABORATION AND ACHIEVEMENTS

### Support to ICARDA's Nile Valley and Red Sea Regional Program

The Netherlands is one of the main donors supporting ICARDA's Nile Valley and Red Sea Regional Program (NVRSRP), which was started in the late 1970s. This program covers research, technology transfer and training to improve the production of cool-season food legumes (faba bean, chickpea and lentils) and cereals (wheat and barley). Some of the NVRSRP achievements are described below.

### Improving Barley Production in Ethiopia

Barley cultivation and usage in Ethiopia is unique. In no other country is the crop grown in such diverse conditions of rainfall, soils and farming systems. The average annual national yield of barley is low—around one ton per hectare, which leaves a great potential for improvement. With financial support from the Netherlands, a collaborative project on barley research was implemented by the Ethiopian Agricultural Research Organization (EARO) and ICARDA in 1993–1998 to develop and transfer new technologies to small farmers to increase productivity and ensure sustainability of barley production.

Using baseline surveys, the project identified a range of barley production systems, including characterization of the locations and defin-



*A Barley Traveling Workshop held in Ethiopia brought together researchers from Egypt and Ethiopia to review on-farm trials*

ing the constraints to improved production systems. Of all the crops grown in the study areas, barley showed the highest diversity. A total of 107 cultivars were reported to be grown. The project, therefore, redirected the breeding program towards utilization and improvement of the Ethiopian landraces to increase yields and conserve the wealth of biodiversity in barley production. In addition, improved varieties were developed with resistance to pests and diseases found in Ethiopia. One of the more successful varieties 'Shege' was released in 1996 for both early and late systems mainly produced under low and high input conditions. The project also identified six shoot-fly-resistant barley lines and 26 other promising lines; and tested lines that showed tolerance to scald, net blotch, leaf rust and spot blotch. The barley improvement project also developed and recommended production packages including fertilizer and seed rate, sowing date and weed control.

### **Strengthening Research and Transfer of Technology for Sustained Production of Cool-season Food and Forage Legumes in Ethiopia**

Production of cool-season legumes in Ethiopia is low and highly variable due to the use of local low-yielding varieties, diseases and pests, and inappropriate cultural practices. To address these problems, the Netherlands funded a four-year project (1998–2001) to develop and transfer yield-enhancing and adapted legume varieties with the desired traits and appropriate crop management practices. It was implemented by EARO with technical backstopping from ICARDA. The main achievements of the project are highlighted below.

#### ***Crop improvement***

##### **Faba bean**

Two high-yielding and chocolate spot resistant varieties 'Shallo' and BPL 18021-2 were released in 2000. Five additional promising varieties adapted to waterlogged vertisols were released in the 2001 and 2002 cropping seasons.

##### **Chickpea**

Two varieties of Kabuli chickpea—'Arerti,' resistant to *Fusarium* wilt and *Ascochyta* blight, and 'Shasho', resistant to *Fusarium* wilt—were released in 2000. Three other promising varieties—high yielding and moderately

Ascochyta blight resistant—were identified for release in mid-altitudes of northwest Ethiopia. The varieties yielded higher than the check variety 'Mariye.'



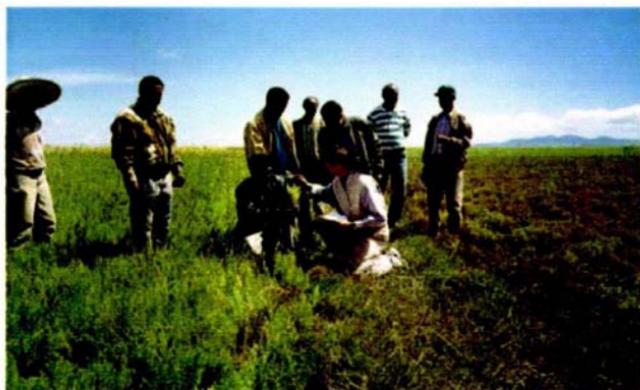
*Screening chickpea lines for resistance to Fusarium wilt in a wilt-sick plot in Ethiopia. The susceptible control (middle) wilted and turned yellow, while the resistant lines planted on left and right fared much better.*

### **Field pea**

Two high-yielding varieties were released in 2000: 'Tulu dimtu' by the Sinana Research Center for the highlands of Bale and 'Wolmera' by the Holetta Research Center for the central highlands.

### **Lentil**

The main emphasis of the project was on demonstrating and popularizing rust resistant varieties released prior to the project by the Debre Zeit Research Center, in particular 'Gudo', 'Aada', and 'Alemaya'. In addition, the candidate variety, 'Assano', was released in 2003 and 'Alem Tena' and 'Teshale' varieties were released in 2004.



*Rust devastated lentil in Ethiopia in 1996/97, but the improved rust-resistant cultivar 'Aadaa' (left) stayed green and healthy*

### **Crop management**

Crop management experiments provided optimum combinations of fertilizers, seed rate and land preparation practices necessary to increase yield in cool-season legumes. As a result, farmers have experienced increased crop yields. More than 90% of farmers of the Chefe Donsa district, for example, adopted the new lentil variety 'Alemaya' and early sowing (late August), as recommended by the project, and they are getting much higher yields. The effect of tillage and weeding on field pea yield was studied through a three-year trial conducted in west Shoa. The results show that the highest yield was obtained under two plowings (mid-April and at planting) and one hand weeding. For faba bean, the highest yield was obtained with three plowings (two prior to and one at planting) and one hand weeding.

### **Socioeconomic studies**

Even when the performance of recommended technologies is robust, their adoption by farmers is influenced by various social and economic factors, which include preferences, attitudes and perceptions, and access to inputs, outputs, markets and credit. Understanding these factors is essential if the technology generation and transfer efforts are to be tailored to farmers' circumstances and capacities. Therefore, the project carried out socioeconomic diagnostic surveys. Cost-benefit analysis was used to determine the relative profitability of alternative technologies before their transfer to farmers. The project also initiated activities aimed at assessing the role of women in food production and household food security.

### *Capacity building*

The project played an essential role in strengthening research/development capacity by providing training opportunities to scientists, extension agents and farmers, and enhancing scientists/farmers interaction through visits and traveling workshops. Human resource development achieved through the project considerably strengthened the research capabilities of EARO and most participating research centers.

## **Helping Sudan Move Toward Self-Sufficiency**

### **in Wheat Production**

The Netherlands provided financial support for ICARDA's work in Sudan, the results of which are very encouraging. On-farm demonstrations of improved wheat production packages showed yield increases of up to 117%, and economic analysis indicated very high marginal rates of return. Support from the Government of Sudan and the attractiveness of the wheat production packages helped farmers to increase Sudan's production from 157,000 tons in 1987 to 859,000 tons in 1992, when Sudan reported that it had attained self-sufficiency. Despite a decline since, production remains higher than in the 1980s.

### *Chickpea*

Chickpea yields in large production/demonstration plots in Sudan also increased by up to 154% in three areas with high marginal rates of return.

### *Lentil*

As part of the same program, collaboration between ICARDA and Sudan's Agricultural Research Corporation produced improved lentil production packages, based on local cultivars and practices tested on farmers' fields. These packages—in combination with government policies that include credit support, guaranteed good prices for the harvest, and the provision of threshing and decortication facilities—helped to increase lentil production in Sudan significantly. Between 1989 and 1993, the lentil area expanded from 420 to 10,000 ha; yields increased from 0.8 to 1.4 tons per hectare; and production increased from 340 to around 13,000 tons. As a result, imports reduced drastically from around 8340 tons in 1989 to 1000 tons in 1993.

## Legume Networks

The Netherlands also supports problem-solving regional networks, which are part of the NVRSRP, involving cool-season food legumes and cereals in the Nile Valley countries and Yemen. ICARDA is a partner in all the networks, and works with the Agricultural Research Center (ARC) Egypt; Institute of Agricultural Research (IAR), Ethiopia; Agricultural Research Corporation (ARC), Sudan; Agricultural Research and Extension Authority (AREA), Yemen; the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); and the International Maize and Wheat Improvement Center (CIMMYT). The networks themselves focus on research around the following topics:

- Sources of primary inoculums of stem and leaf rusts of wheat: their pathways and sources of resistance
- Management of wilt and root-rot diseases of cool-season food legumes
- Integrated control of aphids and major virus diseases in cool-season food legumes and cereals
- Thermo-tolerance in wheat and maintenance of yield stability in hot environments
- Water-use efficiency in wheat
- Socioeconomic studies on adoption and impact of improved technologies.



*Faba bean necrotic yellow virus in a farmer's field in the Fayoum Governorate of Egypt. The virus caused 60–90% yield losses in Middle Egypt in 1991/1992 and 1998/1999.*

Activities include: developing improved diagnostic methods to identify virus diseases and computer simulations of crop growth; studying the impact of improved technology on farm income levels and production; and the effect of policy and institutional factors on technology transfer and adoption.

### Support to Virology Research at ICARDA

The Netherlands Government supported the establishment of the virology laboratory at ICARDA in 1985. Initial research activities were carried out in partnership with the Institute for Plant Protection at Wageningen, the Netherlands; and the Lebanese National Council for Scientific Research; and the Faculty of Agricultural and Food Sciences at the American University of Beirut. The virology laboratory is crucial to ICARDA's work. It helps to study the incidence of viral diseases in food legumes, cereals and pasture crops that are of importance to ICARDA. Methods for seed testing, screening and control of viral infections have been developed over the years. The Netherlands support also helped to develop ICARDA's human capacity in virology research.

### Support to ICARDA's Seed Program

#### *Establishing ICARDA's seed unit*

Funding from the Netherlands was instrumental in establishing ICARDA's Seed Unit, which aims to strengthen the region's seed programs through

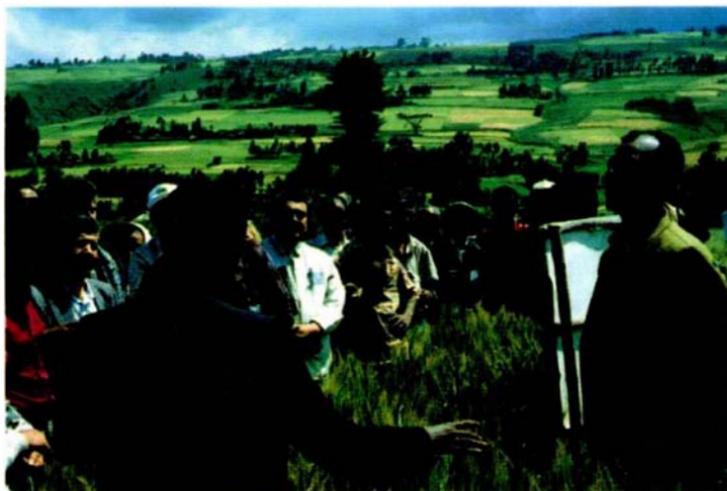


*The seed processing facility at ICARDA's headquarters in Aleppo, Syria*

training, seed production, seed technology research, infrastructural development, and information dissemination. Since 1991, the Unit has been working closely with the International Agricultural Center (IAC) in Wageningen. IAC has also sponsored several regional and in-country courses in WANA and worked with ICARDA to develop training curricula for several joint courses at the University of Jordan. ICARDA also contributes to international seed technology training at the IAC. The seed unit at ICARDA is fully equipped and capable of conducting research in seed supply systems and human resource development.

### ***Development of national seed production organizations in West Asia and North Africa (WANA)***

This project was started in 1985, with financial support from the Netherlands and Germany, and completed at the end of 1996 after three consecutive phases. Project activities included: human resource development for the seed sector; production of limited quantities of quality seed; morphological variety description of cereal and legume crops; economics of seed production; informal seed supply; practical-oriented research in seed technology; and information dissemination. From 1985 to 1995 a total of 1051 staff from over 30 countries within and beyond WANA region attended several regional, sub-regional and in-country courses related to seed technology. The main beneficiaries were the national seed production organizations, followed by the



*Seed specialists from West Asia and North Africa visit a farmer's wheat field in Ethiopia*

national agricultural research systems.

The project also supported the establishment of WANA Regional Seed Network coordinated by ICARDA. The Network has 19 member countries and 11 observers with the ultimate objective of integrating the national seed systems of member countries to promote seed trade in the region and beyond.

The project produced many publications, including workshop proceedings, training manuals, and audiotutorials at ICARDA or in cooperation with NARS partners.

### *Regional seed training project*

This project was implemented in the period 1996–2000 by the Seed Unit with financial support from the Netherlands. It aimed to strengthen the capacities of national seed organizations in the WANA region by providing training in different aspects of seed technology. Using a 'training the trainer' approach, the project was successful in conducting training closely linked to the participants' working environments. During the project period, a total of 716 staff from the national agricultural research systems, public and private seed sectors, NGOs and farmers' groups attended the regional and in-country courses and workshops on issues related to seed sector development. More specifically, the 'train-the-trainers' program trained 44 'trainers', who trained 259 national staff, and 155 staff attended workshops. The project also supported three postgraduate students in seed science and technology.

### *Collaboration with IAC and Wageningen University*

From inception, the Seed Unit of ICARDA served as part of an international organizing committee and regularly contributes to the Management of Seed Programs and Seed Technology course organized by the International Agricultural Center in Wageningen for middle and senior level managers from developing countries of Africa, Asia and South America. The Seed Unit also collaborated with the Wageningen University in conducting seed systems studies with national partners within CWANA.

## **Projects Under the CGIAR Challenge Program on Water and Food**

ICARDA is participating in the CGIAR Challenge Program on Water and

Food, funded by the Netherlands. The Challenge Program will create research-based knowledge and methods for growing more food with less water, and develop a transparent framework for setting targets and monitoring progress.

Three projects proposed by ICARDA under the Challenge Program on Food and Water were approved for funding and implementation starting 2004. These are:

### ***Improving water productivity of cereals and food legumes in the Atbara River Basin of Eritrea***

This five-year (2004–2008) collaborative project aims to contribute to enhancing food security and alleviating poverty in the Atbara basin of Eritrea by strengthening agricultural research, seed and extension systems. It will use gender-sensitive participatory approaches to increase crop water productivity, using low-cost inputs, while minimizing risk and ensuring sustainability of production.

Rainfed crop production in Eritrea is carried out using traditional methods of cultivation, and constitutes 95% of national crop production. Cereals are the dominant component in diets throughout the country. Barley accounts for 16% of the total food crop production. Barley and wheat are produced mainly in the highlands for the local market for staple food consumption. Cool-season food legumes, namely, chickpea, lentil, faba bean, cowpea and grass pea (*Lathyrus sativus*), because of their high protein content (23–26%), provide a major portion of the daily protein requirements. They can be a source of income to farmers since they are valued on the local market, and they can improve soil fertility through their nitrogen-fixing ability.

Major technical constraints to crop production include highly variable and erratic rainfall, with recurrent droughts; damage caused by insect pests and diseases; genetic erosion of indigenous landraces; land degradation due to erosion and declining soil fertility; minimal inputs and lack of improved cultural practices and cultivars adapted to local conditions; lack of post-harvest storage facilities; lack of good quality seed; inefficient water distribution systems in irrigated schemes; and insufficient draft animals and cultivation equipment.

The project will produce new varieties of cereals and food legumes, with associated management practices, in partnership with farmers; establish seed systems which supply farmers with quality seed in a sus-

tainable manner; and enhance farmers' skills in participatory research and in community based seed production. It will also strengthen the capacity of national institutions to carry out participatory research and technology transfer, and to monitor and assess the impact of their research; and strengthen linkages between research, seed, and extension departments by working together in cooperation with farmers and farmers' communities.

### ***Improving on-farm agricultural water productivity in the Karkheh River Basin (KRB)***

The purpose of this four-year project is to help the poor communities in the KRB, Iran, to sustainably improve their income and livelihoods. The objectives of the project are: (i) to improve farm and basin water productivity and the sustainable management of the natural resource base; (ii) to develop appropriate policies and institutions and enhance the capacity of NARS.

The research will be community-based with full participation of farmers, community leaders, local institutions and policy-makers. Three benchmark sites will be selected under rainfed and irrigated conditions. Experiments and demonstrations will be conducted under researcher- and farmer-managed conditions to develop, test, apply, and improve the adoption of water management options. An integrated approach to developing efficient systems will be used. Socioeconomics will form an integral component of the project to ensure a problem-solving approach and a high adoption rate. Special attention will be given to the role of women, while policies and institutional structures will also be examined. Studies on water productivity levels and existing policies and institutions will be conducted in the Euphrates and Amu Darya basins.

The project is expected to improve water productivity in target areas, which will lead to improved farmers' income and living standards. Outscaling of results to other areas in the basin and the country will be done through influencing policies and suggesting effective institutions at the community and scheme levels. Moreover, conducting relevant activities in the Euphrates and Amu Darya basins will provide additional insight.

### ***Strengthening livelihood resilience in upper catchments of dry areas by integrated natural resources management***

This four-year project aims to strengthen livelihood resilience of the rural poor and to improve environmental conservation in upper catchments of the dry areas. It will be conducted in Karkheh River Basin (KRB), Iran.

In the upper areas of KRB, 75% of the forests and about 90% of the rangelands are degraded. Poor vegetation cover, degraded physical and chemical soil properties and a disturbed water balance can be clearly observed. Consequently, surface runoff is high, causing widespread erosion, regular flooding downstream and high sediment yields in the reservoir of the Karkheh dam. As a result, the expected lifetime of the Karkheh dam may reduce. The degradation of the resource base has also contributed to the relative poverty of the rural communities in the region and to the high rural-urban migration rate.

The project intends to achieve two major objectives: (i) to improve the adaptive capacity of involved stakeholders to strengthen livelihoods in these marginal dry environments in a sustainable way; and (ii) to develop an appropriate methodology that will combine livelihood strategies with watershed management and that can be used beyond the study sites in a wide spectrum of dry environments. At the end of the project, it is expected that there will be an increased capacity of local communities at the benchmark sites to improve their livelihoods, increased understanding of rural livelihoods in dry upper catchments and watershed management principles, improved organisation and research capacity for integrated projects, and a methodology and toolbox to facilitate research and development in these areas.

## OTHER INITIATIVES SUPPORTED BY THE NETHERLANDS

### Rehabilitation of Traditional Water Supply Systems: Sustainable Management of Groundwater Resources

Shallalah Saghirah is a small village of approximately 20 households located in the Khanasser Valley, northern Syria, which still uses an ancient "qanat" system for drinking water and irrigation of a community garden. The villagers have realized that renovation of the qanat is necessary in order not to lose their main source of water for domestic and agricultural use.

Consequently, the villagers, in collaboration with ICARDA scientists who evaluated the water system and how it can be better used for agricultural production, decided to renovate the system. The activities and priority setting were based on the local expertise of the villagers.

The renovation of the qanat was part of an applied anthropological action research project at the village level conducted within ICARDA's Khanasser Valley Integrated Research Site (KVIRS). Through intensive fieldwork and comparing literature on other studies, investigations were conducted on how qanat systems can be renovated using low-cost new technologies. The study also considered how the qanat system could be communally managed in the future and what kind of common property system is relevant.

The study was jointly funded by ICARDA and the Netherlands Development Assistance (NEDA).

### Comprehensive Assessment of Water Resources

ICARDA is also participating in the project on Comprehensive Assessment of Water Resources, managed by IWMI and supported by the Netherlands, with funding for ICARDA's Assessment of Water Harvesting and Supplemental Irrigation Potential in Arid and Semi-Arid Areas of West Asia and North Africa.

### Collection and Characterization of Germplasm of Wild Relatives of Wheat (1988 to 1994)

This project focused on the systematic collection, identification, taxonomic classification, and evaluation of the wild taxa of *Triticum* and the

genus *Aegilops*. The project produced a systematic collection and characterization of material from the entire distribution area, and resulted in a well-documented and representative collection of some 2100 accessions now available to breeders and other researchers worldwide. It resulted in a comprehensive publication: M.W. van Slageren, 1994. Wild wheats: a monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig (Poaceae). ICARDA/Wageningen Agricultural University Press 94-7, 512 pp.

### **CGIAR Program on Gender**

ICARDA participates actively in the Systemwide Program on Participatory Research and Gender Analysis (PRGA), which is supported by the Netherlands.

## COLLABORATION WITH RESEARCH INSTITUTES IN THE NETHERLANDS

The Wageningen University and Research Center is one of the world's leading institutions of higher learning offering graduate degrees in different disciplines of agriculture. ICARDA is collaborating with the University in human resource development for NARS through joint supervision of postgraduate students and provision of internships. ICARDA's Seed Unit is also conducting a series of seed systems studies in collaboration with national partners within the Center's region. Within this framework, the Wageningen University provided financial support and academic supervision for the Wheat and Barley Seed Systems study conducted in Ethiopia and Syria for the fulfillment of a PhD degree for an ICARDA staff member in the Seed Unit.

The Center has also had continued collaboration with the Erosion and Soil and Water Conservation Group, Department of Environmental Sciences, Wageningen University. Students from the department have done research at ICARDA on tillage erosion in the steep olive orchards in Afrin; water harvesting for olive trees and water harvesting and watershed modeling in Khanasser Valley.

The International Soil Reference Information Center (ISRIC) and ICARDA have worked together using Geographic Information Systems to model soils; the Royal Tropical Institute, Free University of Amsterdam, and the University of Wageningen worked with ICARDA on *Orobanche* control; and the University of Utrecht worked with the Center on water-use efficiency in wheat and barley, and studies of population dynamics in barley. Several Dutch students have done their PhD research at ICARDA in these collaborative projects.

## LOOKING TO THE FUTURE

The Netherlands support for agricultural research in CWANA region is an important contribution to the region's stable economic growth and development, which is still haunted by the threat of hunger. This support has been human as well as financial. Dutch scientists have made, and continue to make, an important contribution to ICARDA's work, both as staff and as visiting scientists. The Netherlands government's assistance to agriculture in developing countries goes far beyond the provision of emergency relief aid and trade credits; it is designed to achieve sustainable growth that protects the environment and the small farmers who rely on it for their survival. This approach will go a long way in helping the countries of the region to achieve the Millennium Development Goals.

## DUTCH MEMBERS OF ICARDA BOARD OF TRUSTEES

Dr Jan Koopman	1977–1983
Dr Roelof Rabbinge	1987–1993
Dr Teresa Fogelberg	2002–Present

## DUTCH SCIENTISTS AT ICARDA

Dr Karl Harmsen	Soil Chemist	1981–1991
Mr Riens Nicks	Durum Breeder	1981–1984
Dr Jan Koopman	Deputy Director General	1985–1988
Dr Tony van Gastel	Head, Seed Unit	1985–1996/ 2002–Present
Dr Joop van Leur	Barley Breeder	1987–1995
Dr Aart van Schoonhoven	Deputy Director General (Research)	1987–1995
Dr Michael van Slageren	Genetic Resources Scientist	1988–1994
Mr Karl Timmerman	Postgraduate Fellow	1990–1993
Dr William Janssen	Economist	1992
Mr Gerard van Eeden	Scientific Database Analyst	1993–1998
Ms Bianca van Dorrestein	Visiting Research Fellow	1996–2002
Ms Josepha Wessels	Associate Expert/ Applied Anthropology	1997–2001
Mr Soren Jorgensen	Junior Professional Officer	1997–1998
Dr Adriana Bruggeman	Agricultural Hydrology Specialist	1998–Present
Dr Lukas Brader	Consultant	2003–2005

**Cover:**

External review of barley improvement project in Ethiopia: Leader of the review team from the Netherlands (second from left) interviews a farmer.

# Ties that Bind

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