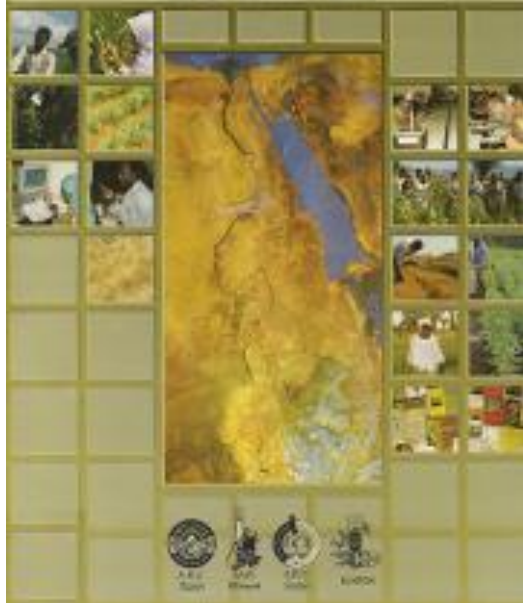


The Nile Valley Regional Program (NVRP)

# A MODEL FOR TECHNOLOGY TRANSFER

Muhammad E. Ismail

Regional Coordinator, NVRPC/ARCS



## FOREWORD

The Nile Valley Regional Program (NVRP) on Cool-Season Food Legumes and Cereals has been an effective model for regional tripartite cooperation. Strong and effective linkages have been developed among **National Agricultural Research Systems (NARSS)** in **Egypt, Ethiopia and the Sudan; Donors;** and the **International Center for Agricultural Research in the Dry Areas (ICARDA)**. Through this program, ICARDA's involvement in the Nile Valley Region has been characterized by dynamic interactions, not only with its partners in this model of cooperation, but also with other sister centers, particularly CIMMYT and ICRISAT, and more recently IIMI.



Representing ICARDA's first outreach program in the region, only two years after it became operational, the Nile Valley Project (NVP) started in 1979 with a program on Faba Bean Improvement in Egypt and the Sudan. Ethiopia joined the NVP in 1985 to add a new milestone to ICARDA's collaboration in the Nile Valley Region. NVP was supported through IFAD for three 3-year phases (1979/80-1987/88). Italy became a significant contributor to the third phase. The NVP concept was initiated by former ICARDA Director General, Dr. Mohamed A. Nour, with the enthusiastic endorsement of H.E. Prof. Dr. Youssef Wally, Egyptian Deputy Prime Minister and Minister of Agriculture and Land Reclamation. Both are considered founders of the NVP/NVRP model. H.E. Prof. Wally has continued to be a keen supporter of the program. As a man of great vision, he has also been a dynamic force behind the collaboration with CG-Centers in general, and has been effectively supportive of the development of strong cooperation between the Nile Valley countries, away from the political arena. This stand was shared by Their Excellencies the Ministers of Agriculture in both Ethiopia and the Sudan; all having the common belief that research is the basis of national agricultural development.

Based on the impact of NVP on faba bean national production, the project was expanded to become the Nile Valley Regional Program (NVRP), in which multicommodities (faba bean, lentil, chickpea, field pea, barley and wheat) were included. It eventually acquired the support of several donors, and involved multicenters (ICARDA with CIMMYT in wheat and ICRISAT in chickpea). Because of the strong mutual benefits to the partners, bilateral funding to the three NVRP countries has partly supported the regional component which tackles problems of common interest and promotes the exchange of expertise among the four full partners (Egypt, Ethiopia, Sudan and ICARDA). This facilitated the effective utilization of the limited human and physical resources available to NARSSs.

The inclusion of long-term resource management research for sustainable productivity in Egypt in 1994 has added another dimension to the framework of NVRP activities. In late September 1995, a major development, represented by the creation of the Nile Valley and Red Sea Regional Program (NVRSRP), took place by extending the NVP/NVRP to cover the Red Sea countries, namely, Yemen and Eritrea. However, this publication documents the NVP/NVRP concept and activities involving Egypt, Ethiopia and Sudan.

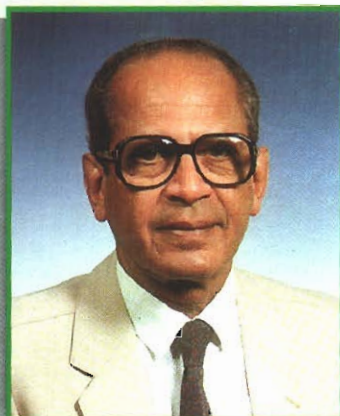
I became acquainted with the NVP for the first time in 1981, during my participation in the First International Conference on Faba Bean Improvement. Since then, I became interested in NVP/NVRP and contributed to the program; from a national program perspective at that time. During the presidency of H.E. Prof. Wally of the Ministerial Session of the World Food Council, I presented his proposed Second Green Revolution Concept, particularly for Africa and South America. The main features of this concept were based on regional cooperation with strong linkages with the International Agricultural Research Centers (IARCs) and with multi-donor involvement, using NVRP as an example of a successful operational model. This was endorsed by the Sixteenth Ministerial Session of the World Food Council, in Bangkok, Thailand in May, 1990.

Our national partners who have played a leading role in this collaboration deserve the credit for the success of the NVP, and subsequently NVRP. Great appreciation is expressed to all the donors: **IFAD, Italy, the European Union, the Royal Netherlands Government and the Swedish Agency for Agricultural Cooperation with Developing Countries (SAREC)**. Recognition is also due to all ICARDA former and current staff who have contributed to the distinguished success of this program, namely, Dr. Mohamed Nour, Dr. Jeofrey Hawtin, Dr. Bhup Bhardwaj, Dr. M.C Saxena and Dr. Mahmoud Solh, who have been extending additional horizons to collaborative research, partnership with NARSs and donor relations. With NVP/NVRP impact on the outcome of research, transfer of technology to farmers and institutional development, the National Programs and ICARDA have a success story to tell and be proud of.

Adel El-Beltagy  
Director General, ICARDA  
December 1995

## Historical Note

It all started at an evening reception held during a CGIAR meeting in Washington. That was in November 1978 when the idea of the Nile Valley Project (NVP) was first promoted. Four years earlier, the World Food Conference in Rome had created the International Fund for Agricultural Development (IFAD). It was already a vigorously growing institution with a keen lookout for expanding the frontiers of its activities. Representing IFAD in that CGIAR Meeting was its Assistant President, Moise Mensah. We had known each other as peers for almost a decade, when he was FAO Regional Representative for Africa, while I was his counterpart for the so-called, Near East Region.



I outlined to him the rationale for financing this project by IFAD (with ICARDA as the implementing center), to serve Egypt and the Sudan. I stressed how cost-effective it would be. The NVP proposal was not to be modelled upon the pattern of the standard format of UN Projects. It would, instead, maximize the rich assets of existing national experts, by giving each participating national scientist a fixed honorarium in return for undertaking part of an agreed annual assignment at the beginning of each season. The Project, I expounded, would be monitored by ICARDA, through an effective system of management, and financial and operational audit mechanisms, clearly stated in the basic text of the Project Document and agreed upon beforehand by IFAD.

In answer to his question: "How Much?" I replied: US\$ 1 million a year, for three years, as Phase One. This was the sum required to support research, and on-farm field trials on faba bean (a basic poor-man's staple daily diet in both countries). Mr. Mensah immediately grasped the notion. He promised that this proposal would get his full backing in IFAD, upon presentation by ICARDA of a brief Project Document and upon obtaining the written endorsement of the two Governments concerned, Egypt and Sudan.

The approval of Egypt was not only promptly positive, but it also offered to host this new activity in Cairo. With the enthusiastic endorsement of H.E. Prof. Dr. Youssef Wally, Egyptian Deputy Prime Minister and Minister of Agriculture and Land Reclamation, Egypt offered most inviting "Terms" for hosting the NVP, should ICARDA/IFAD decide to locate it in Egypt. On its side, the Sudan willingly endorsed the project, as well as supported the Egyptian request to act as host.

Following approval by members of the Board in 1979; less than a year from the conception of the Project, the Director General established ICARDA Regional Office in Cairo. Operations started in November 1979. All the operational responsibilities lay vested squarely in the hands of the national scientists, backed by the ICARDA Food Legume Program, at that initial stage, and overseen by the ICARDA Management.

Now, in the fullness of time, of over sixteen years, ICARDA has a success story to tell. Thanks to IFAD, followed by a number of other generous donors (Italy, the European Union, the Royal Netherlands Government and SAREC of Sweden), this Center has helped develop this exciting new model of collaborative research at country, regional and international levels. However, the key performers have originally been the national research scientists of Egypt and Sudan. Soon after, Ethiopia joined. Two more member nations—Eritrea and Yemen—have recently joined. The exercise started with faba bean, followed by chickpea, lentil, wheat and then barley; with a significant and sustained overview input of socio-economic research. Thus, the success story of the Nile Valley Project unfolded and developed into the Nile Valley Regional Program (NVRP). When Dr. Bhardwaj, the first Director of ICARDA's Regional Office, retired five years ago, Dr. Mahmoud Solh was appointed. Dr. Solh added yet other horizons of new and exciting collaborative research.

The NVP, subsequently the NVRP, gained strength and stature. It grew through the tenure of three ICARDA Director Generals. This year, and together with the rest of the ICARDA family, it warmly welcomed the fourth Director General: Dr. Adel El-Beltagy. He has had himself, and for several years, a firsthand cognizance of the NVRP from his previous vantage position, as a top man in agricultural research in Egypt.

As you read through this document, its pages recount the tale of a living model of technical cooperation among developing countries. All those who have been involved in its initiation and growth, especially the national scientists and their associates, should proudly cherish this outstanding achievement. They can confidently expand and consolidate, with the scientific and logistical participation of ICARDA, given that precious financial flow from supportive donors.

Mohamed A. Nour  
ICARDA Former Director General (1980-87)  
December 1995

## NILE VALLEY COUNTRIES

### NILE VALLEY COUNTRIES

#### BACKGROUND INFORMATION

The Nile Valley countries under consideration, namely, Egypt, Ethiopia and the Sudan cover a wide range of eco-systems in the northeast of Africa. These Nile Valley countries have diverse environmental conditions ranging from dry desert lowlands to tropical humid highlands including vast areas under continental climate.

Agriculture is predominantly irrigated in Egypt (99%) while in Ethiopia it is predominantly rainfed (97%). In the Sudan, rainfed areas comprise 80% of the total cultivated land.

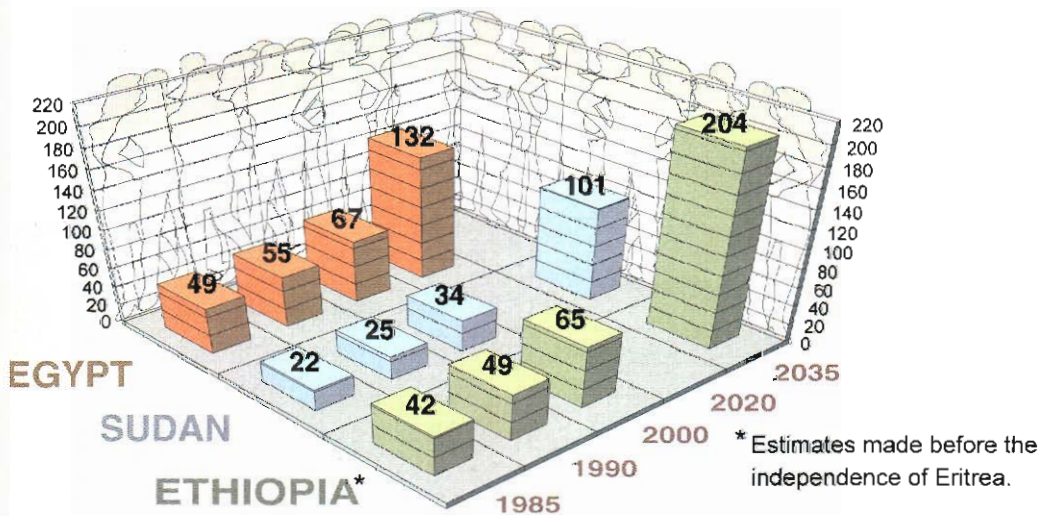


Land Distribution,  
Average 1987-91

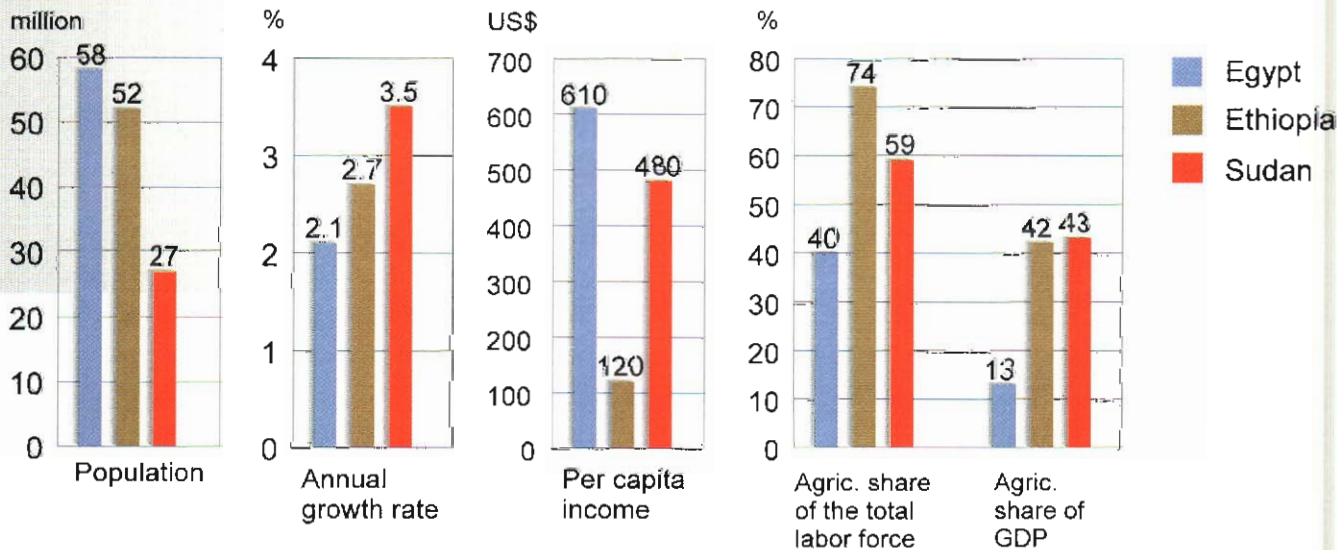
|                         | Area (in million ha) |          |        |
|-------------------------|----------------------|----------|--------|
|                         | Egypt                | Ethiopia | Sudan  |
| Arable Crops            | 2.80                 | 12.79    | 13.20  |
| Permanent Crops         | 0.31                 | 0.07     | 0.73   |
| Total Agricultural Land | 3.11                 | 12.85    | 13.93  |
| Irrigated Land          | 2.60                 | 1.89     | 0.16   |
| Permanent Pasture       | 2.60                 | 108.60   | 44.95  |
| Forest and Wood         | 0.03                 | 45.14    | 27.20  |
| Other Land              | 93.80                | 71.01    | 24.20  |
| Total                   | 99.55                | 237.60   | 110.10 |

Source: FAO (Agro-stat).

Estimated Population Growth in the Nile Valley Countries

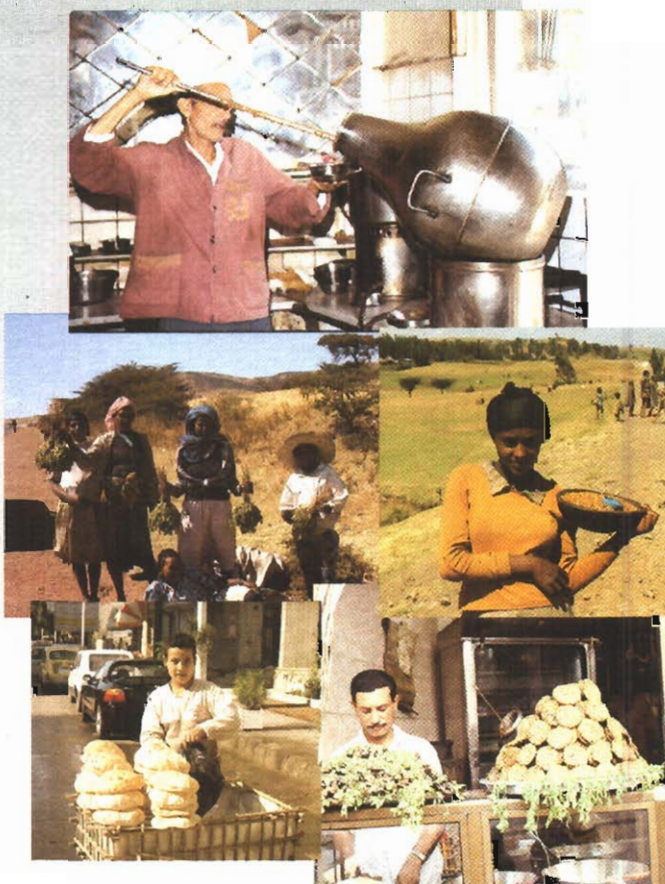


Population Characteristics and their Contribution to Agriculture in the Nile Valley Countries



The Nile Valley Region has a considerable deficit in food production which is usually supplemented by large quantities of imported grain, sometimes in the form of foreign aid from the international community.

Both cool-season food legumes (faba bean, chickpea, field pea and lentil) and cereals (wheat and barley) are important staple food crops and are essential components of the daily diet for people in the three countries. Their nutritional values are complementary. Legumes are high in protein (21 to 32%) and lysine, but limiting in sulfur-containing amino acids, whereas cereals are high in both starch and S-containing amino acids but limiting in lysine. Thus, increasing the production of both legumes and cereals will alleviate malnutrition problems in these countries. In addition, legume rotations provide sustainability to soil productivity.



**Production Statistics of Crops of Interest to NVRP in the Three Nile Valley Countries, Average 1990-92 (wheat average 1991-93)**

| Country  | CROP                 |        |           |          |        |
|----------|----------------------|--------|-----------|----------|--------|
|          | Wheat                | Barley | Faba Bean | Chickpea | Lentil |
|          | Area (1000 ha)       |        |           |          |        |
| Egypt    | 901                  | 73     | 149       | 6        | 6      |
| Ethiopia | 690                  | 950    | 238       | 130      | 46     |
| Sudan    | 355                  | -      | 29        | 2        | 5      |
| Total    | 1946                 | 1023   | 416       | 138      | 57     |
|          | Production (1000 t)  |        |           |          |        |
| Egypt    | 4457                 | 154    | 436       | 10       | 12     |
| Ethiopia | 900                  | 941    | 281       | 113      | 33     |
| Sudan    | 603                  | -      | 43        | 1.7      | 6      |
| Total    | 5960                 | 1095   | 760       | 125      | 51     |
|          | Average Yield (t/ha) |        |           |          |        |
| Egypt    | 5.29                 | 2.20   | 2.96      | 1.78     | 1.85   |
| Ethiopia | 1.29                 | 0.99   | 1.18      | 0.87     | 0.72   |
| Sudan    | 1.68                 | -      | 1.49      | 0.83     | 1.28   |
| Average  | 3.06                 | 1.07   | 1.83      | 0.93     | 0.89   |

# NILE VALLEY COUNTRIES, ICARDA, AND DONORS:

## Historical Background

Cooperation between the National Agricultural Research Systems (NARSs) in the Nile Valley and ICARDA started since its establishment in 1977. Cooperation began through exchange of germplasm, technical support and training for the improvement of food legumes and cereals in Egypt, Ethiopia and the Sudan. The Nile Valley Project (NVP) was established in 1979 to improve faba bean production and ICARDA's Cairo Office became operational in that year. The International Fund for Agricultural Development (IFAD) financed the first phase of the project (1979-82) in Egypt and the Sudan. Based on the considerable achievements of the first phase, IFAD extended its support for a second phase (1982-85). Ethiopia became a full partner in the project in late 1985.

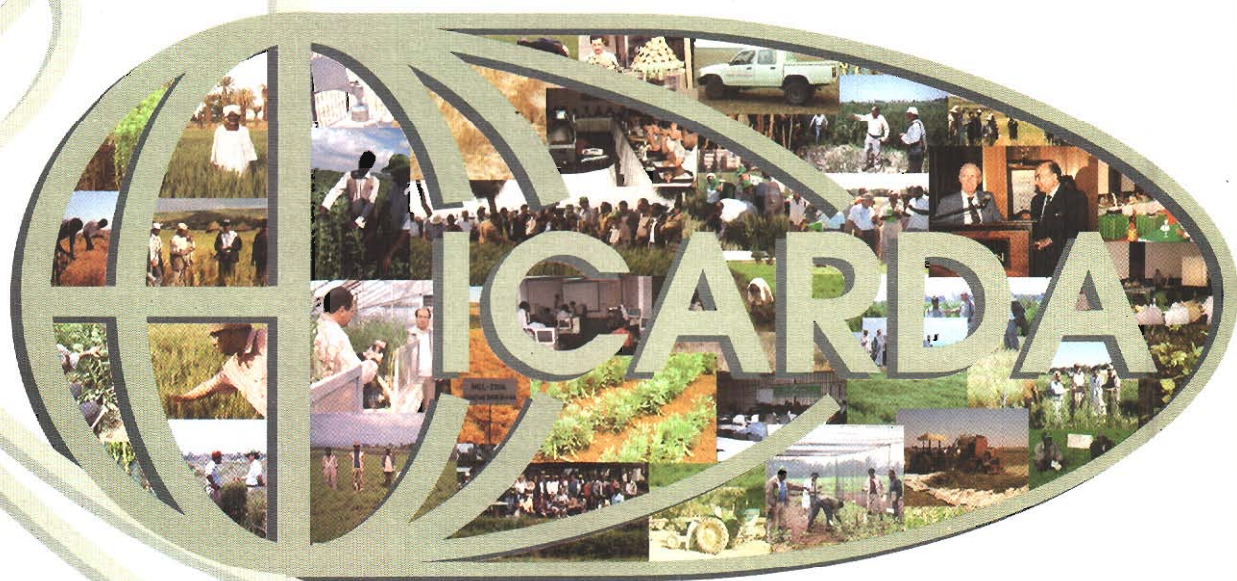
In the third 3-year phase (1985-88) of the NVP, IFAD scaled down its contribution and Italy supplemented the 3-year grant after realizing the importance of the programs and the achievements made.

Because of the impact of NVP on increasing faba bean production in the countries involved, the project was

expanded in 1988/89 to become the Nile Valley Regional Program on Cool-Season Food Legumes and Cereals (NVRP). It focuses on the improvement of faba bean, chickpea and lentil in the three countries of the region, field pea in Ethiopia and cereals (wheat and barley in Egypt, wheat in the Sudan, and recently barley in Ethiopia).

NVRP is currently supported by three donors: the European Union (Egypt), the Royal Netherlands Government (the Sudan and Ethiopia) and the Swedish Agency for Research Cooperation with Developing Countries or SAREC (Ethiopia).

The first 3-year phase of the NVRP in Ethiopia and the Sudan ended on 31 December, 1991. The project was extended in Ethiopia to February, 1994, and in the Sudan to September, 1995. Financed by the EU, the second phase (NVRP-Phase II) for Egypt was extended for another five years starting June, 1994 to May, 1999. Phase-II includes long-term research on Resource Management in addition to the commodity (Food Legumes and Cereals) programs.

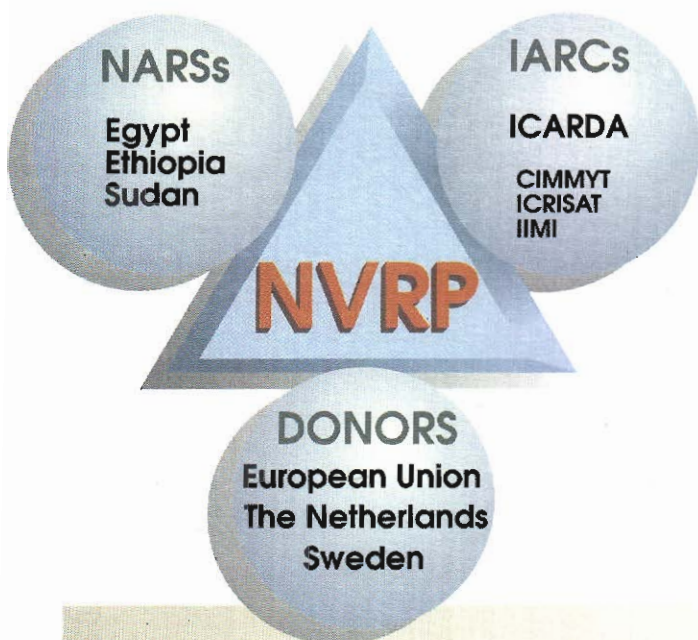


## THE NILE VALLEY REGIONAL PROGRAM

The Nile Valley Project (NVP), was established in 1979, only two years after ICARDA became operational. It is ICARDA's first outreach project/activity to strengthen regional programs. Well-defined and effective strategies were set for coordination and cooperation at national and regional levels. The NVP was a model for tripartite cooperation among National Agricultural Research Systems (NARSS), International Agricultural Research Centers (IARCs) and IFAD, as a donor, until 1988. The NVP was extended, as indicated, to the Nile Valley Regional Program (NVRP).

The main objectives of NVRP are improved productivity of cool-season food legumes and cereals and ensured sustainability of production systems in different agro-ecological zones. This is to be attained by the development and transfer of improved production technology to farmers in the Nile Valley countries: Egypt, Ethiopia, and the Sudan with different sources of financing as indicated earlier.

### Tripartite Cooperation



### What does it do?

- ☐ Links scientists both within countries and within the region.
- ☐ Caters for research and training needs to strengthen gaps in the NARS.
- ☐ Provides feedback from these regions to ICARDA's main research station in Syria to orient its research programs.
- ☐ Promotes leadership at the national and regional levels.
- ☐ Promotes researcher-extensionist-farmer linkages.
- ☐ Facilitates cooperation to solve problems common to a group of countries.
- ☐ Optimizes the use of scarce resources and encourages self-reliance.
- ☐ Develops a partnership between NARSS and ICARDA.



## Major Contributors

### Egypt

#### **Agricultural Research Center (ARC)-main collaborator**

- Field Crops Research Institute (FCRI)
- Plant Pathology Research Institute (PPathRI)
- Plant Protection Research Institute (PPRI)
- Soil and Water Research Institute (SWRI) (NVRP-Phase II)
- Agricultural Economics Research Institute (AERI)

#### **Desert Research Center (DRC) (NVRP-Phase II)**

#### **Water Research Center (WRC) (NVRP-Phase II)**

#### **National Research Center (NRC) (NVRP-Phase II)**

#### **Ain Shams University (NVRP-Phase II)**

### Ethiopia

#### **Institute of Agricultural Research (IAR)-main collaborator**

- Research and Extension Division
- Department of Field Crops
  - Highlands Pulses Program
  - Barley Improvement Program
  - Bread Wheat Improvement Program (Wheat Rusts Network)
- Department of Agronomy and Crop Physiology
- Department of Plant Protection
- Department of Agricultural Economics

#### **Alemaya University of Agriculture (AUA, Debre Zeit Agricultural Research Center)**

- Chickpea and Lentil Program
- Durum Wheat Improvement Program (Wheat Rusts Network)

#### **Extension Department, Ministry of Agriculture**

### Sudan

#### **Agricultural Research Corporation (ARC)-main collaborator**

- Breeding Section
- Food Legumes Research
- Wheat Research
- Agronomy and Crop Physiology Section
- Botany and Plant Pathology Section
- Entomology Section
- Food Technology Section
- Agricultural Economics Section

#### **University of Khartoum**

#### **University of Gezira**

#### **Irrigation Schemes and Extension Services**

## Major Contributors

### ICARDA

#### International Cooperation-Cairo Regional Office Germplasm Program

- Legumes Subprogram
- Cereals Subprogram

#### Farm Resource Management Program (NVRP-Phase II, Egypt)

#### Computers and Biometrics Service Unit (CBSU)

#### Genetic Resources Unit (GRU)

#### Training Coordination Unit (TCU)

#### Communication, Documentation and Information Services (CODIS)

### Other IARCs

#### CIMMYT in Wheat

#### ICRISAT in Chickpea

#### IIMI in NVRP-Phase II, Egypt

### Donors

#### International Fund for Agriculture Development (IFAD) (supporting Egypt and Sudan)

- NVP-Phase I, 1979/80-1981/82
- NVP-Phase II, 1982/83-1984/85

#### IFAD and Italy (supporting Egypt, Sudan and Ethiopia)

- NVP-Phase II, 1985/86-1987/88

#### The European Union (supporting Egypt)

- NVRP-Phase I, 1988/89-1993/94
- NVRP-Phase II, 1994/95-1998/99

#### The Royal Netherlands Government (supporting Sudan)

- NVRP-Phase I, 1988/89-1990/91
- NVRP-Phase II, 1991/92-1994/95

#### The Swedish Agency for Research Cooperation with Developing Countries (SAREC) (supporting Ethiopia Food Legumes)

- NVRP-Phase I, 1988/89-1990/91
- NVRP-Phase II, 1990/91-1992/93

#### The Royal Netherlands Government (supporting Ethiopia)

- NVRP-Barley, 1993-1996

#### The Royal Netherlands Government (supporting Egypt, Ethiopia, Sudan and Yemen)

- Regional Networks Project, 1995/96-1997/98

## NVP/NVRP STRATEGY

The strategy is to capitalize on NARS research strength to undertake the whole research program with backstopping from ICARDA. This is done by reducing the main constraints of NARSs by:

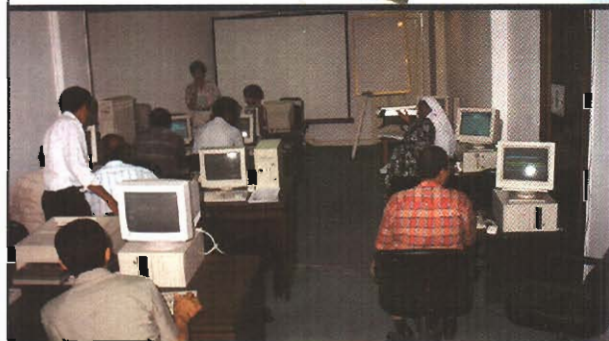
- ❑ Supporting NARSs in obtaining outside funding for operational support to coordinate activities and research programs.
- ❑ Facilitating contact of NARSs within and between participating countries to benefit from expertise developed in individual countries, ICARDA, and other centers of excellence elsewhere in the world.
- ❑ Strengthening coordination of research and networking amongst the partners in this system and beyond.

### National Level

Strong national programs and common interest in solving production problems are prerequisite to regional cooperation and effective regional networks.

To develop strong and effective national research and technology transfer programs, the following program components are essential and complementary:

- ❑ Clear objectives and research approaches.
- ❑ A qualified, multidisciplinary research team; linking researchers, extensionists, and farmers.
- ❑ Necessary facilities and resources, obtained through national programs/donors.
- ❑ Coordination of research activities.
- ❑ Focus on farmer-level activities.



### Regional Level

The regional strategy is based on two types of interactions: between ICARDA headquarters and each national program, and among national programs themselves. In the first, ICARDA plays an important role by strengthening both national and regional programs through technical backstopping. In the second type of interaction, ICARDA plays a catalyst role.

Member countries in a region or scientists in a regional network will only cooperate if there is mutual benefit when contributing to regional activities to capitalize on NARS research strength to achieve national interest. Complementarity in national and regional research work is achieved through coordination to utilize the limited human and physical resources more effectively.

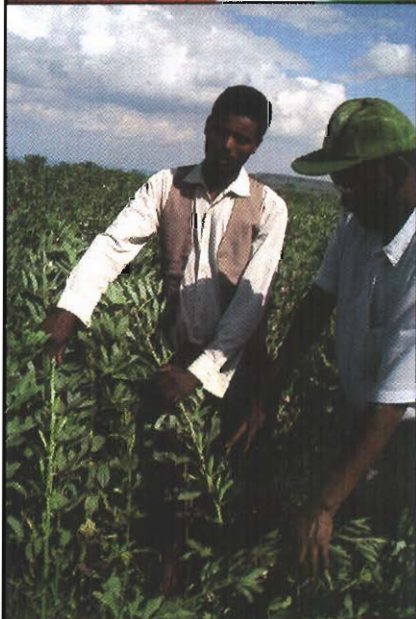
## APPROACH AND ACTIVITIES

### The NVRP Methodology

The NVP (and later the NVRP) has used a research approach in which national programs in collaboration with ICARDA plan the work, but the national scientists conduct and report the research. Expertise at the national institutes is being enhanced through training and participation in professional activities. Thus, the main elements of the strategy adopted for the implementation of the various phases involve:

- ❑ Enhancement of self-reliance in the national program for leadership, coordination, and effective planning and execution.
- ❑ Strong emphasis on on-farm research and demonstrations.
- ❑ Involvement of extension staff and farmers in demonstration fields; reduced emphasis on on-station research.
- ❑ Close coordination within and between the Nile Valley countries across disciplines aiming at complementarity in research efforts among the three countries.

Besides assisting NARSS in obtaining funding for special projects, ICARDA has been providing technical support, regional research coordination, fund management and administrative logistics. CIMMYT and ICRISAT have provided technical input for wheat and chickpea improvement, respectively.



## The NVRP Methodology

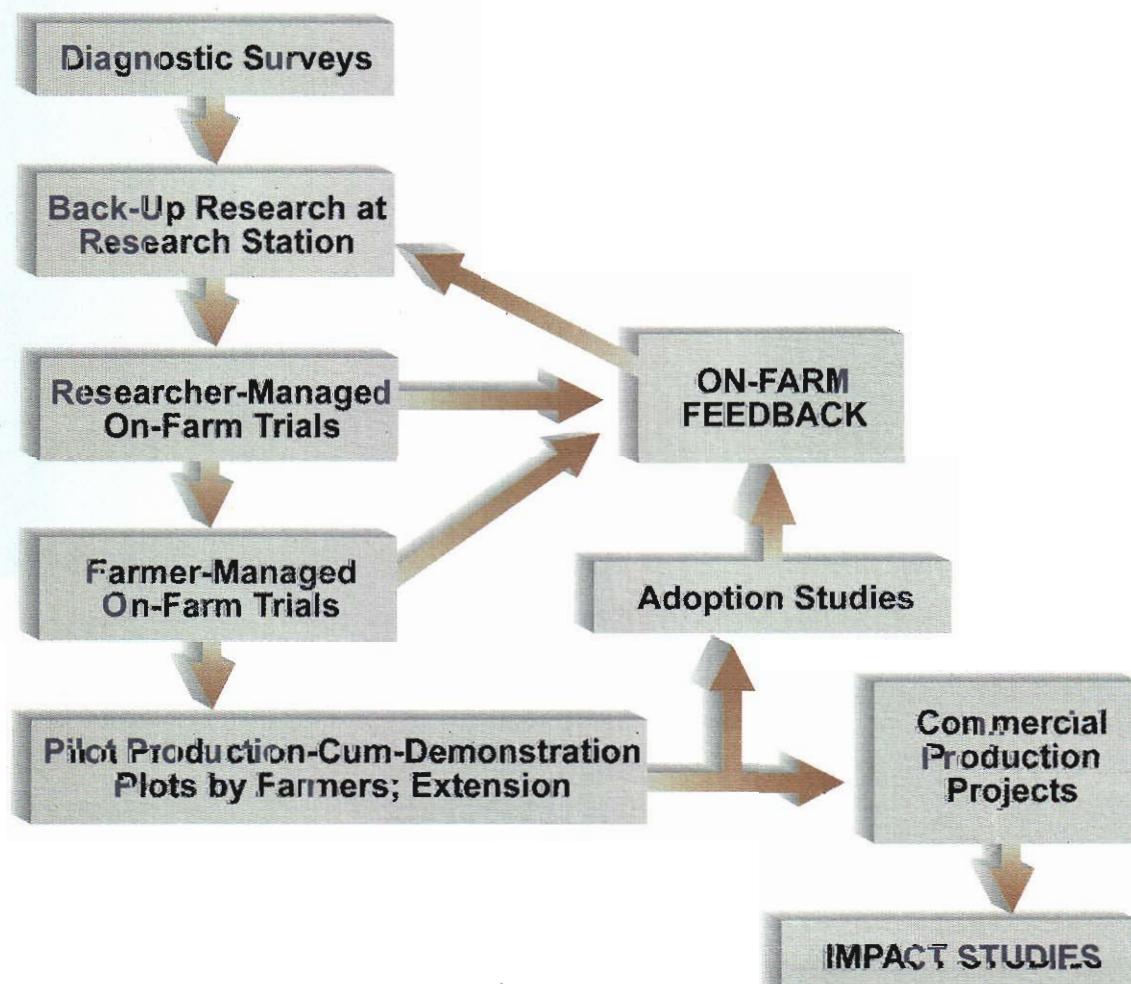
NVRP research is conducted in three phases:

**Back-up research:** Activities under this phase cover gaps in applied research knowledge. They include new areas of research or research to resolve constraints facing the adoption of new technologies by farmers. Most back-up research is carried out on the research station. The main objective of back-up research is to find solutions to second generation problems identified in the researcher- and farmer-managed trials, as well as to identify/develop new cultivars and other management practices which will further boost production in different agro-climatic zones.

**On-farm researcher-managed trials:** Evaluate experiment station findings under actual farm conditions. The organization, management and supervision of these trials remains with the research scientists. Treatments that provide larger economic return than those normally obtained by farmers are included in subsequent farmer-managed demonstrations.

**Farmer-managed demonstrations:** Use the technologies tested successfully on farms under the supervision of researchers and extension workers. Large pilot production fields are laid out by farmers with advice from researchers including socio-economists and extensionists. These demonstrations provide an excellent tool for extension activities through the organization of field days during the growing season.

### Linkage between Back-Up Research and On-Farm Activities



## Activities of NVRP

The research experience in cereals and food legumes under the various phases of NVRP concentrated on the following:

- ❑ Conducting back-up research to improve current recommendations and to find solutions for specific problems identified in on-farm research and diagnostic surveys.
- ❑ Testing superior cultivars and improved agronomic practices in farmers' fields to evaluate their practicability, economic feasibility and potential utilization by farmers, and providing feedback for researchers to improve the technology through back-up research.
- ❑ Laying out large-scale demonstrations and pilot production fields of high-yielding cultivars and appropriate agronomic practices by extension workers and farmers in major production areas.
- ❑ Conducting adoption studies to assess farmers' perceptions and use of the new technology and providing feedback to researchers to further improve the technology.
- ❑ Improving sustainability of current production systems by stimulating farmers to adopt ecologically sound practices and making better utilization of resources available to them.
- ❑ Conducting impact studies to monitor the returns of the investment to research vis-a-vis national production.
- ❑ Undertaking multiplication of pre-basic seed of improved cultivars in cooperation with seed multiplication organizations to make high-quality seeds available to large numbers of farmers.
- ❑ Arranging non-degree, and to a lesser extent, degree training, study tours, consultancies, coordination meetings, seminars and literature exchanges.
- ❑ Providing key research facilities, breeding material and essential capital items for field and laboratory use.
- ❑ Developing appropriate publications to address needs of various groups including extensionists, farmers, government officials and donor agencies.



## Regional Cooperation

Regional cooperation, built through exchange of germplasm and research technology, joint planning and evaluation, regional travelling workshops and training, is an important feature of the NVRP. The regional component of the program is being strengthened further through complementarity in research efforts in problem areas of common interest to ensure more effective utilization of the limited human and physical resources of the national programs. The regional activities and networks cover the following research areas:

### Regional Networks

#### Formal Networks

- ❑ Wheat Rust Regional Network in the Nile Valley Countries and Yemen: Sources of Primary Inoculum of Stem, Leaf and Yellow Rusts of Wheat, their Pathways and Sources of Resistance.
- ❑ Management of Wilt and Root-Rot Diseases of Cool-Season Food Legumes and Cereals.
- ❑ 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 and Drought Management in Wheat and Barley.
- ❑ Socio-Economic Studies on Adoption and Impact of Improved Technologies.



#### Informal Networks

- ❑ Improvement of Faba Bean, Chickpea and Lentil.
- ❑ Improvement of Wheat.
- ❑ Improvement of Barley.
- ❑ Integrated Control of Chocolate Spot in Faba Bean.



Top and bottom right photos:

Faba Bean Yellow Necrotic Virus (FBYNV) in Egypt.

Bottom left: Inter-regional cooperation with North Africa (Tunisia)



**Wheat Rust Regional Network: Location of Disease Trap Nurseries and Rust Spore Traps**

# Program Implementation

The program is implemented through a sequence of well-defined steps shared between the key partners, namely, the national programs, ICARDA and the donors.

1.

The program relies on the full or part-time efforts of individual national scientists to implement its activities according to a preset annual workplan and budget. National Coordinators are responsible for the implementation of the workplan, project management, and coordinating project activities
2.

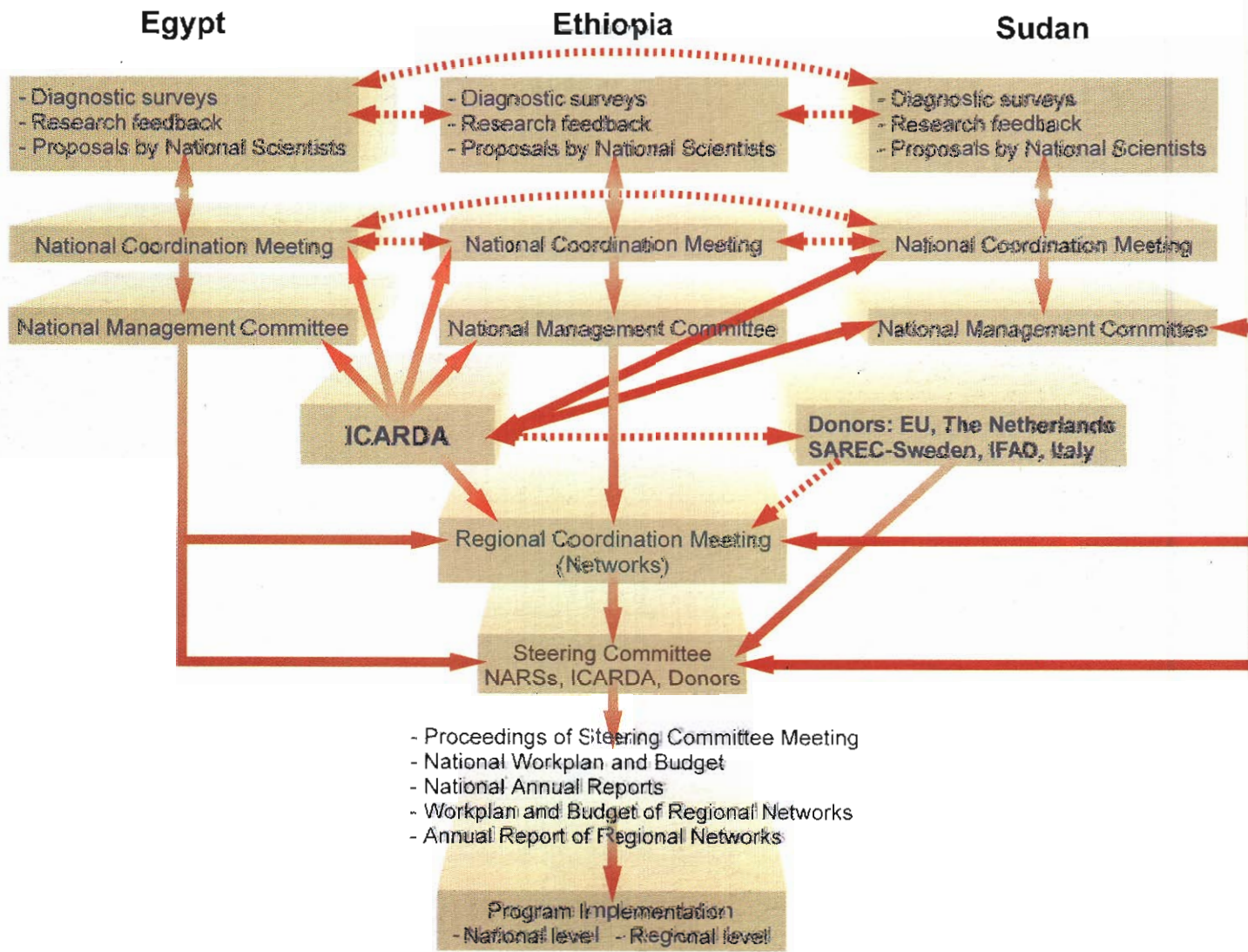
Based on feedback from diagnostic surveys and adoption studies, National Scientists develop research plans in multidisciplinary sessions.
- 3-4.

Proposed research plans are discussed and finalized in the Annual National and Regional Coordination Meetings with participation of scientists from national programs and ICARDA.
- 5-6.

The National Management Committee reviews the proposed workplans and training programs considering budget limitation and forwards them for final approval to the NVRP Steering Committee.
7.

Proceedings of the Annual Coordination Meeting are published in the form of an annual workplan and budget and an annual report. These include highlights of research of the preceding year, and details of the workplan and approved budget for the coming season.

## NVRP RESEARCH MANAGEMENT FLOWCHART



8. National coordinators, supported by the NVRP Regional Coordinator and ICARDA scientists, monitor program implementation. Scientists visit field sites in national or regional travelling workshops during the season to get feedback and enhance sharing of information for future planning. Independent review missions are also organized to evaluate the effectiveness of the project if so desired by the donor.

9. The NVRP Steering Committee meets once annually to evaluate the progress and achieve-

ments toward the overall objectives of the NVRP, assess budget utilization, set the future strategy and decide on action for financing. The membership of the Steering Committee includes representatives of the donor organizations supporting the NVRP; director generals/ general managers and national coordinators of national research institutes in the three countries; ICARDA's Assistant Director General for International Cooperation; concerned ICARDA program leaders, and the NVRP Regional Coordinator.

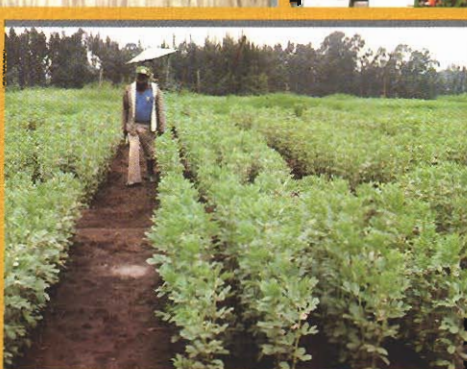
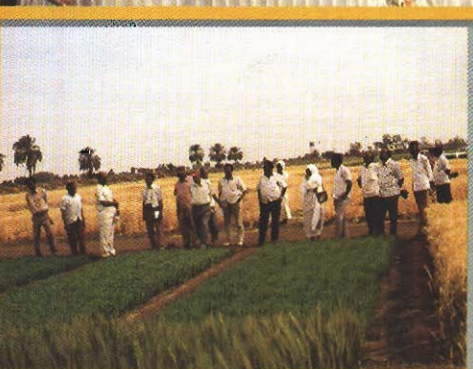
1 Barley Regional Travelling Workshop in Ethiopia

2 H.E. Dr. Teketel Forsido, inaugurating the Barley Research Review and Strategy Workshop in Ethiopia

3 Resistance to wilt/root-rots in chickpea

4 H.E. Prof. Youssef Wally, Deputy Prime Minister and Minister of Agriculture and Land Reclamation, inaugurating the NVRP Regional Coordination Meeting in Egypt with Director Generals of NARSs and ICARDA and representatives of Donors (the EU and the Netherlands).

5 H.E. B.G. El-Zobeir Mohamed Salih, Vice President of Sudan, inaugurating the NVRP Regional Coordination Meeting in Sudan



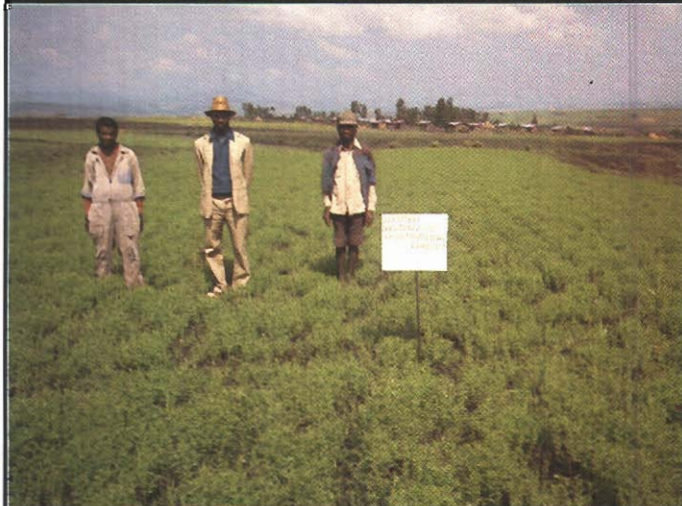
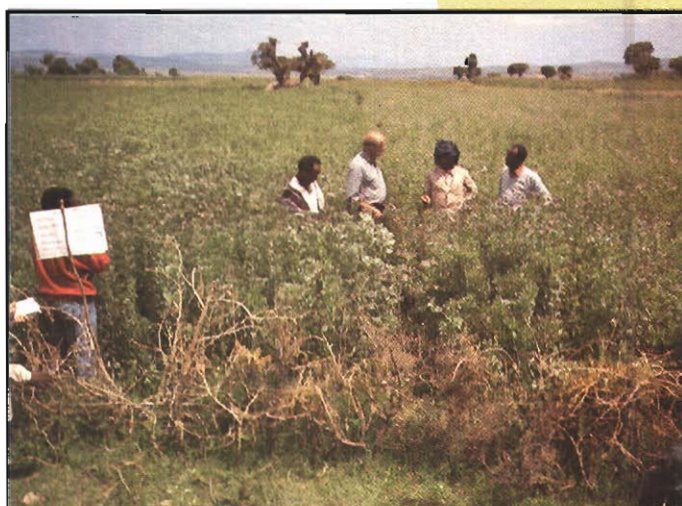
## NVRP EXTERNAL REVIEW MISSIONS

The NVRP has been reviewed by three separate and independent external review missions which were organized by the donors in the three Nile Valley countries. Mission reports documented the success and impact of investment in research and transfer of technology, institutional development and project management. What follows are citations from the reports of the review missions:

### 1990 Review of NVRP Ethiopia (SAREC):

- ❑ *"The support from SAREC to the Ethiopian component of the NVRP has initiated an increased research activity on pulse crops which will produce valuable results within the next few years."*
- ❑ *"An important component of the NVRP is the training of the Ethiopian scientists. This program seems to work well and since many of the Ethiopian scientists don't have proper scientific training, it is also very much needed."*
- ❑ *"The approach to run the project as a regional program with common travelling workshops is good. On these workshops, the scientists from the participating countries have the opportunity to meet and discuss common problems and visit each other's trial sites. It seems also that a sort of competition develops within this cooperation. No country wants to show up inferior research as compared to the other countries. All trial sites visited by the consultant during the travelling workshop in Ethiopia were extremely well managed."*
- ❑ *"Shortcomings include the need for more emphasis on economic aspects and marketing (most serious constraint to increase of production) as well as on on-farm demonstration of improved technology. The report recommended to discontinue research on pesticides and put more emphasis on cultural practices and improved structures of seed stores."*

Dr. Bengt Froman  
SAREC Consultant



## 1993 Review of NVRP Egypt (European Union):

- *"In concluding, the mission regards the present project as highly successful as it has contributed significantly to the increase of wheat and legume production of the country that has occurred during the project implementation period. Its improved cultivars and agronomic practices were generally adopted by farmers and the project's research-extension linkage proved effective. Back-up research under the project was successfully targeted on diseases and pests. The project's implementation procedures provided a model for successful cooperation between national and international research."*
- *"Some shortcomings include the ..... need for future research to address more the environmental dangers to sustainability. The recommended changes demand a more system oriented approach and a long-term perspective of a future project. With its proven management system, the project should have little problem in adjusting to this task."*

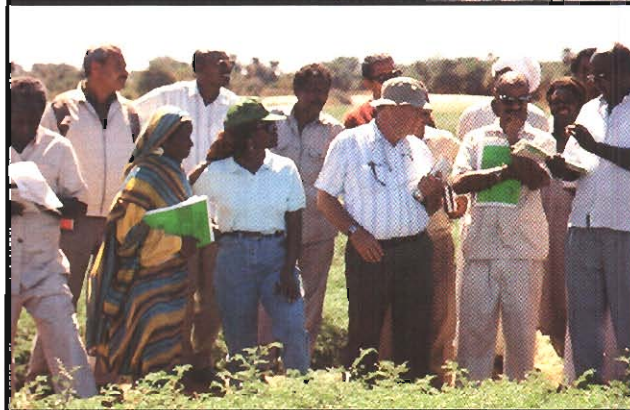
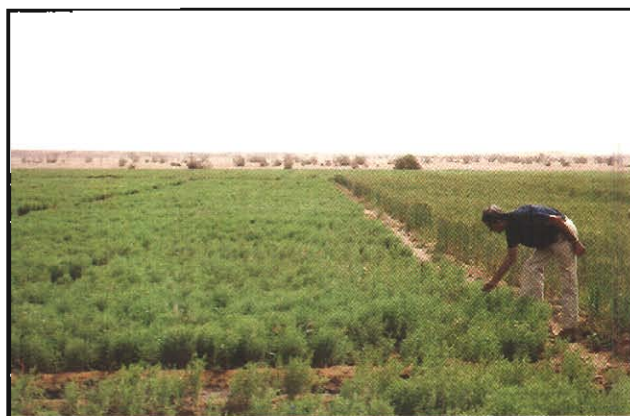
Drs. Ronald Gibbons  
and Walter Kock  
EU Consultants



## 1994 Review Mission of NVRP Sudan (The Royal Netherlands Government):

- ❑ *"The project has in its concept clear emphasis on institutional development as this was missing in the national program. Manpower development included training (both degree and non-degree) as well as scientist participation in seminars, workshops, conferences, etc. NVRP has made it possible for ARC scientists to receive additional training, a phenomenon that had not occurred for 30 years."*
- ❑ *"Linkages of researchers with extensionists and farmers are developed in a remarkable way."*
- ❑ *"Evaluation of project activities is very effectively done through the efficient project implementation schedule. ICARDA scientists of different disciplines visit Sudan regularly and are in a position to see if work undertaken is carried out to plan. The ICARDA Regional Coordinator visits the project regularly for scientific and administrative supervision."*
- ❑ *"In conclusion, the mission wishes to note that the implementation procedures, as defined above, have been very instrumental in the successful operation of the project. National scientists have been fully in charge of day to day project activities but the involvement of ICARDA scientists has been a motivating power behind the national staff."*
- ❑ *To overcome some of the shortcomings, "an additional essential improvement is needed in the working and operation of the Sudan Seed Administration and the seed departments in several of the irrigation schemes."*

Mr. Jan Driessen and  
Dr. Abdel Galil Abdel Gabbar  
The Netherlands Consultants



## THE IMPACT OF THE NVP AND NVRP

- The impact of the NVP and NVRP has been on the outcome of back-up research, transfer of technology to farmers, institutional development and regional cooperation. The transfer of technology to farmers has had a positive impact on national production, particularly in faba bean, wheat, and lentil.

### Impact on Back-up Research

- Through back-up research, several improved high-yielding cultivars of all the crops addressed by NVRP and in all three countries were developed and/or identified for various agro-ecological zones and adverse conditions. Researchers also developed a set of recommendations on cultural practices for local and improved cultivars; these constituted improved production packages recommended to farmers under different agro-ecological conditions. They include, among others, improved cultivars, planting dates and methods, plant population densities, fertilizer use, *Rhizobium* inoculation, and weed, disease and insect pest management, etc.



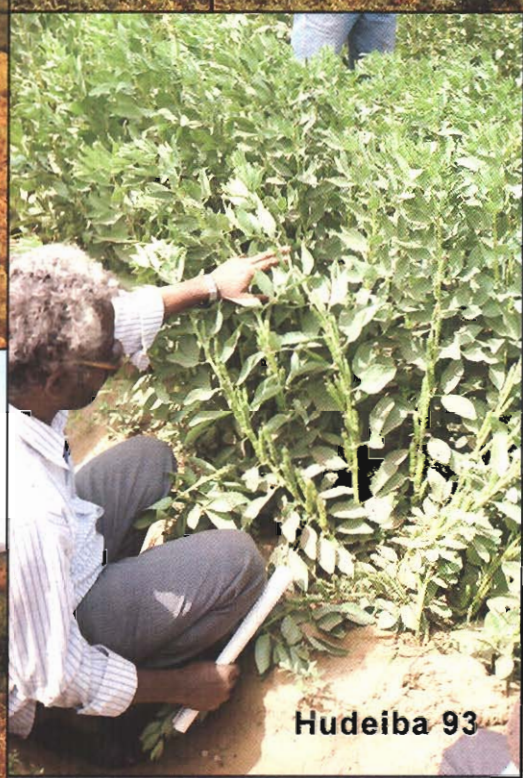
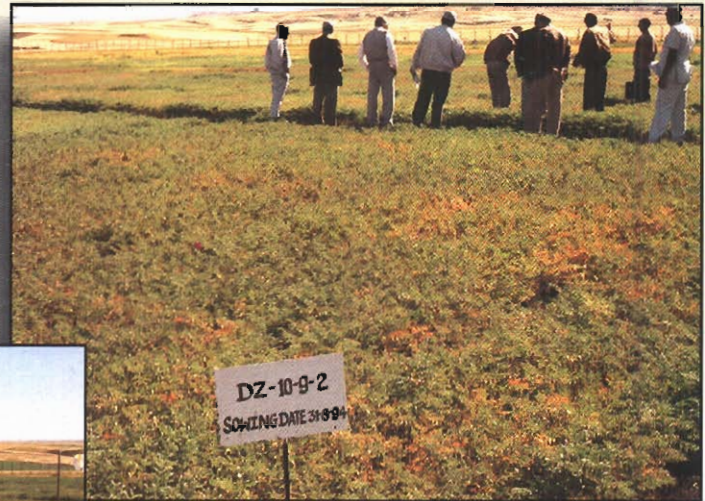
**Cultivars Released and Improved Production Packages Developed and Transferred to Farmers under NVRP**

| Cultivars Released | Egypt     |           | Ethiopia |           | Sudan     |           | Total     |           |
|--------------------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
|                    | Packages  | Cultivars | Packages | Cultivars | Packages  | Cultivars | Packages  | Cultivars |
| <b>Faba Bean</b>   | 4         | 9         | 2        | 2         | 2         | 6         | 8         | 17        |
| <b>Chickpea</b>    | 1         | 3         | 2        | 2         | 2         | 1         | 5         | 6         |
| <b>Lentil</b>      | 2         | 2         | 1        | 3         | 3         | 2         | 6         | 7         |
| <b>Field Pea</b>   | -         | -         | 1        | 5         | -         | -         | 1         | 5         |
| <b>Wheat</b>       | 4         | 6         | -        | -         | 3         | 2         | 7         | 8         |
| <b>Barley</b>      | 1         | 3         | 2        | -         | -         | -         | 3         | 3         |
| <b>Total</b>       | <b>12</b> | <b>23</b> | <b>8</b> | <b>12</b> | <b>10</b> | <b>11</b> | <b>30</b> | <b>46</b> |



▲  
Weed control in Sudan

▼  
Newly released cultivars in Ethiopia ▶  
▼





▲ *Orobancha* resistance and differential attachment of *hystoria* (Egypt)

▼ Board Chairman and Director General of ICARDA evaluating with ARC Director General and national scientists newly released cultivar in Egypt

▼ Resistance to *Botrytis fabae*



# Cultivars Released under NVP/ NVRP or Disseminated to Farmers through NVRP Demonstrations

| EGYPT       |             | ETHIOPIA                                                                                                 | SUDAN         |             |
|-------------|-------------|----------------------------------------------------------------------------------------------------------|---------------|-------------|
| Faba Bean   |             |                                                                                                          |               |             |
| Giza 3*     | Giza 674    | CS 20DK*<br>NC 58*<br>Coll. 111/77<br>75TA26026-1-2-1                                                    | Selaim*       | Shambat 104 |
| Giza 402*   | Giza 714    |                                                                                                          | SML*          | Shambat 75  |
| Giza 429    | Giza 716    |                                                                                                          | Basabeer      | Shambat 616 |
| Giza 461    | Giza 717    |                                                                                                          | Hudeiba 93    |             |
| Giza 643    | Giza Blanca |                                                                                                          |               |             |
| Lentil      |             |                                                                                                          |               |             |
| Giza 9*     |             | Chalew*<br>Chekole (NEL 2704)<br>Gudo (FLIP84-78L)<br>Ada (FLIP86-41L)                                   | Selaim*       |             |
| Precoz      |             |                                                                                                          | Rubatab 1     |             |
| Giza 370    |             |                                                                                                          | Aribo 1       |             |
| Chickpea    |             |                                                                                                          |               |             |
| Giza 195    |             | Mariye*<br>Worku (DZ-10-6-2)<br>Akaki (DZ-10-9-2)                                                        | Shendi 1*     |             |
| Giza 531    |             |                                                                                                          | Jebel Marra 1 |             |
| Giza 531    |             |                                                                                                          |               |             |
| Field Pea   |             |                                                                                                          |               |             |
|             |             | Nc-95-Haik Mohandefer*<br>061K-2P-2/92<br>PGRC/E 32121-1(b)<br>061K-2P-11 1313(B)<br>J No. 116<br>Drap-4 |               |             |
| Wheat       |             |                                                                                                          |               |             |
| Beni Suef * | Sids 1      |                                                                                                          | Debeira*      |             |
| Giza 160 *  | Sids 2      |                                                                                                          | Condor*       |             |
| Giza 164    | Sids 3      |                                                                                                          | Wadi El Neil* |             |
| Giza 165    | Gemmeza 3   |                                                                                                          | El-Neilain    |             |
| Giza 166    | Sahel 1     |                                                                                                          | Sasaraib      |             |
| Giza 167    | Sakha 8 *   |                                                                                                          |               |             |
| Sohag 1*    | Sakha 69    |                                                                                                          |               |             |
| Sohag 3     |             |                                                                                                          |               |             |
| Barley      |             |                                                                                                          |               |             |
| Giza 123*   |             | HB 142*                                                                                                  |               |             |
| Giza 124    |             |                                                                                                          |               |             |
| Giza 125    |             |                                                                                                          |               |             |
| Giza 126    |             |                                                                                                          |               |             |

\* Disseminated cultivars (released before NVP/NVRP)

**Agro-Ecological Zones/Stress Environments for Which Production Packages Were Developed through NVRP**

| EGYPT                                                                                                                                                         | ETHIOPIA                                                                                                                                        | SUDAN                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Faba Bean</b>                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. Delta region</li> <li>2. Upper Egypt</li> <li>3. <i>Orobanche</i> resistance</li> <li>4. Minimum tillage</li> </ol> | <ol style="list-style-type: none"> <li>1. High-altitude areas</li> <li>2. Mid-altitude areas</li> </ol>                                         | <ol style="list-style-type: none"> <li>1. Non-traditional areas (Gezira, Rahad, New Halfa)</li> <li>2. Traditional areas (northern areas)</li> </ol>         |
| <b>Lentil</b>                                                                                                                                                 |                                                                                                                                                 |                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. Delta region</li> <li>2. New lands</li> </ol>                                                                       | <ol style="list-style-type: none"> <li>1. Shewa (mid-altitude areas)</li> </ol>                                                                 | <ol style="list-style-type: none"> <li>1. Rubatab/Dongola</li> <li>2. Wad Hamid</li> </ol>                                                                   |
| <b>Chickpea</b>                                                                                                                                               |                                                                                                                                                 |                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. Beheira Governorate</li> </ol>                                                                                      | <ol style="list-style-type: none"> <li>1. Central Highlands (mid-altitude areas)</li> <li>2. Central Highlands (high-altitude areas)</li> </ol> | <ol style="list-style-type: none"> <li>1. Rubatab - Wad Hamid</li> <li>2. Northern State and Jebel Marra</li> </ol>                                          |
| <b>Field Pea</b>                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                              |
|                                                                                                                                                               | <ol style="list-style-type: none"> <li>1. Nationwide</li> </ol>                                                                                 |                                                                                                                                                              |
| <b>Wheat</b>                                                                                                                                                  |                                                                                                                                                 |                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. Upper Egypt</li> <li>2. New Valley</li> <li>3. Fayoum</li> <li>4. New lands</li> </ol>                              |                                                                                                                                                 | <ol style="list-style-type: none"> <li>1. Gezira - New Halfa - Rahad</li> <li>2. Dongola/ Rubatab</li> <li>3. Kali/Kaboushia Agricultural Schemes</li> </ol> |
| <b>Barley</b>                                                                                                                                                 |                                                                                                                                                 |                                                                                                                                                              |
| <ol style="list-style-type: none"> <li>1. Northwestern Coastal Region</li> </ol>                                                                              | <ol style="list-style-type: none"> <li>1. Central Ethiopia</li> <li>2. Northwest Ethiopia</li> </ol>                                            |                                                                                                                                                              |

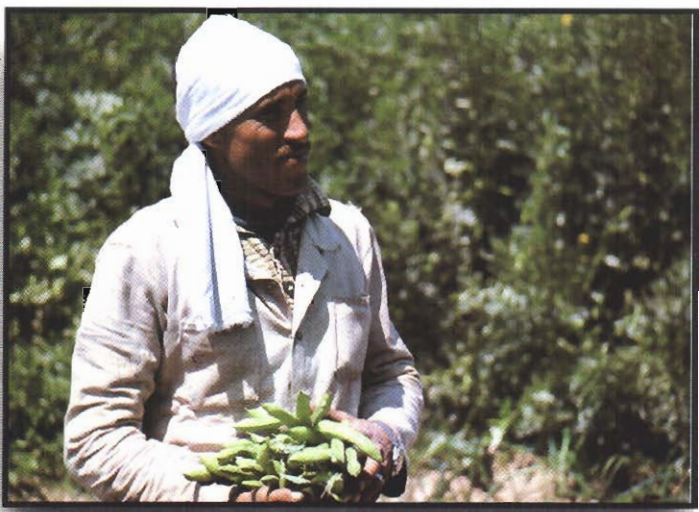
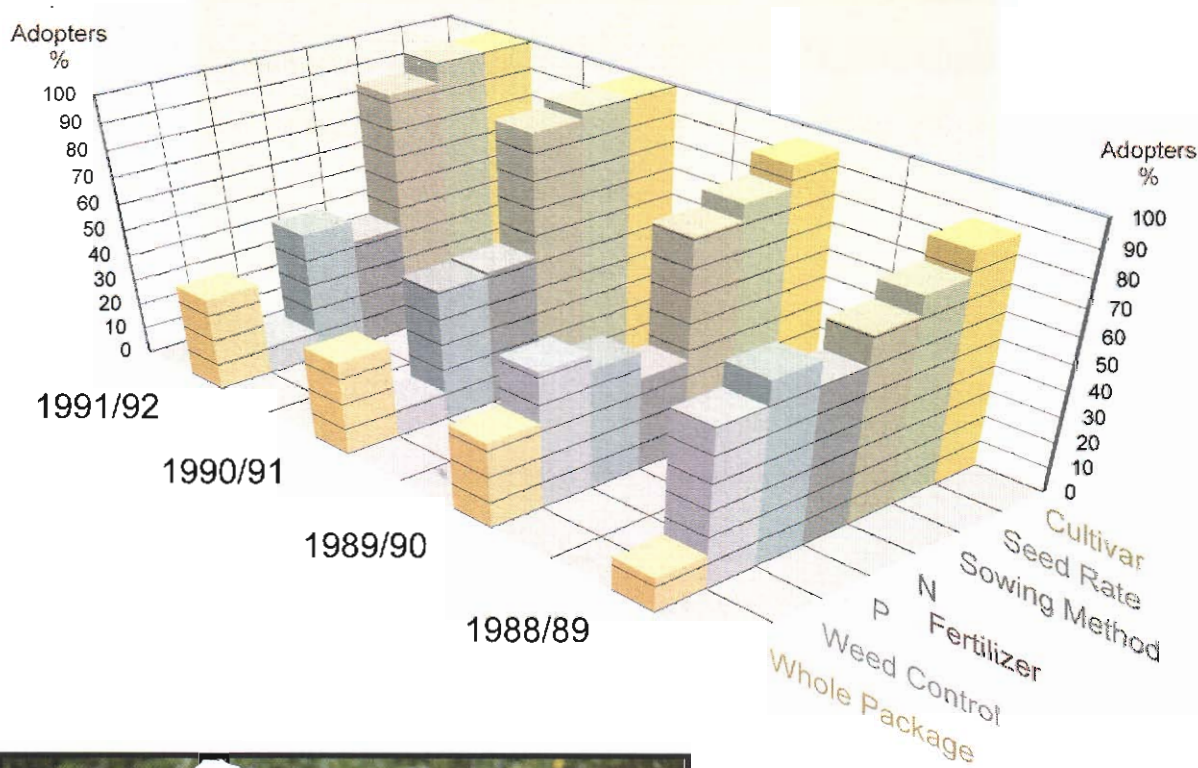
# Adoption and Impact of Technology Transfer

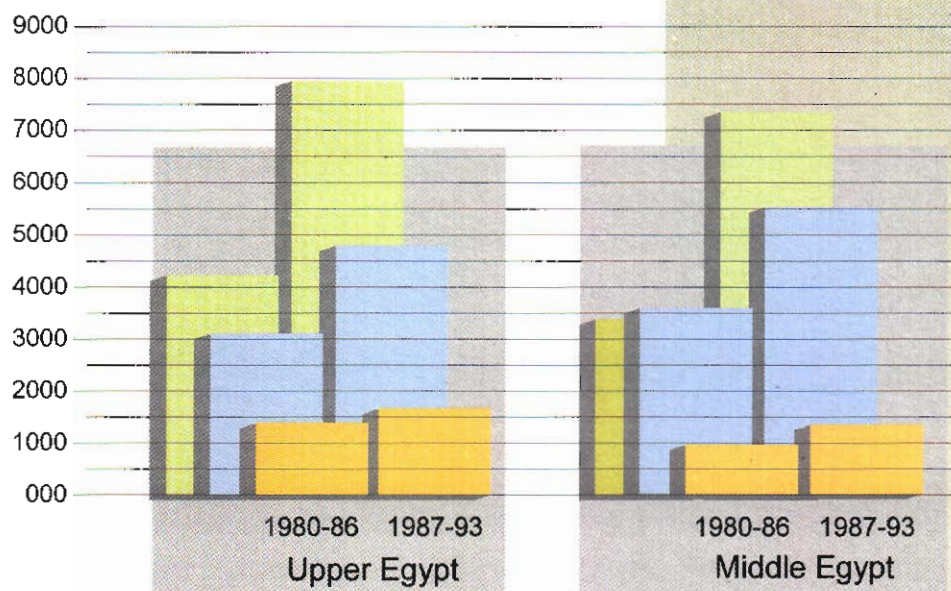
All the packages developed in back-up research were demonstrated to farmers in several locations and sites in all three countries. A few examples are presented on the impact of technology transferred to farmers.

## Egypt

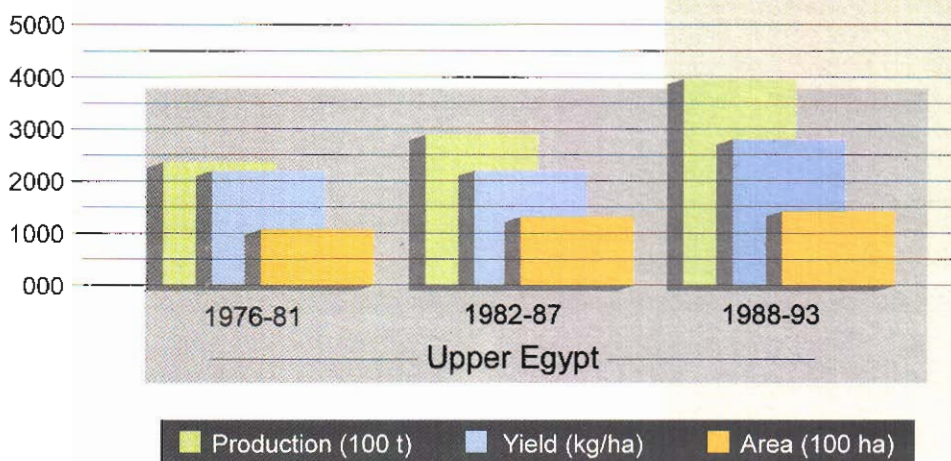
High levels of adoption reaching 77, 73, and 64% for improved irrigation regime, planting date and cultivars, respectively, were reported for wheat technology in Upper Egypt. Similarly, faba bean improved technology received wide acceptance. The contribution of technology development and transfer has been reflected on national production of the two crops.

**Adoptions of Different Components of Faba Bean Improved Production Packages Demonstrated to Farmers over Four Seasons in Minia, Egypt**



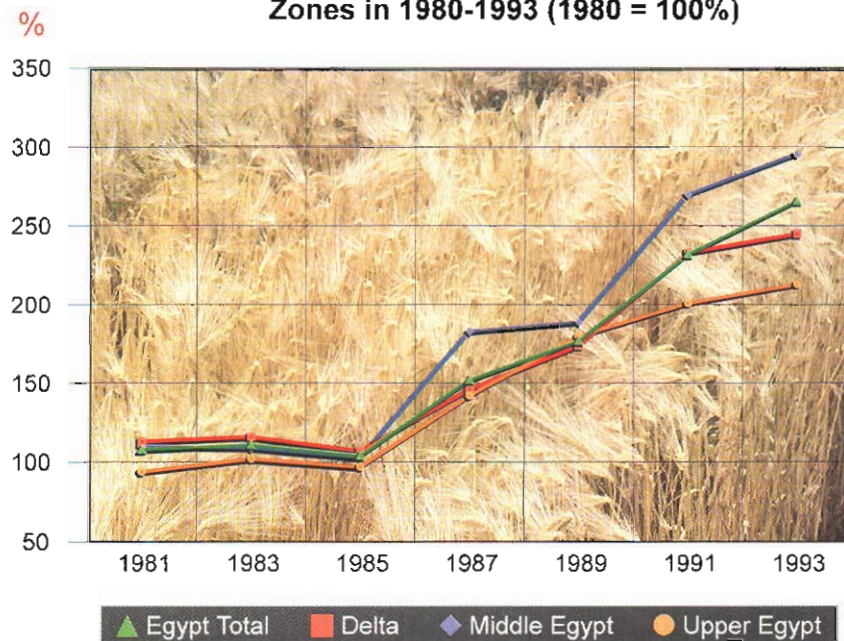


Development in average area, production and yield of wheat over two periods (1980-86 and 1987-93) in Upper and Middle Egypt



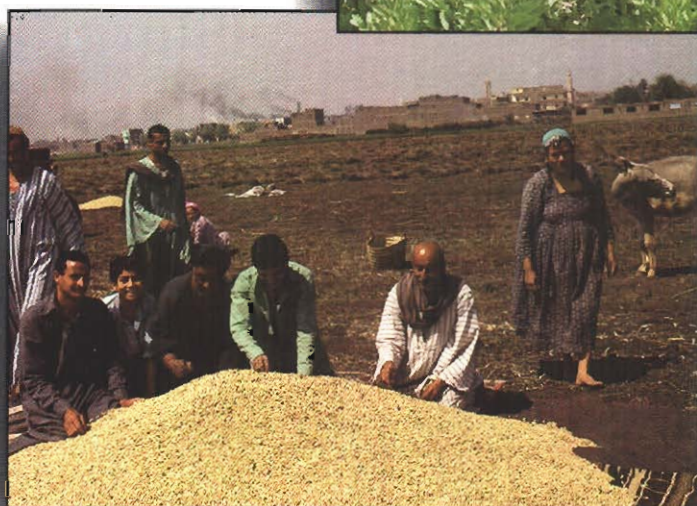
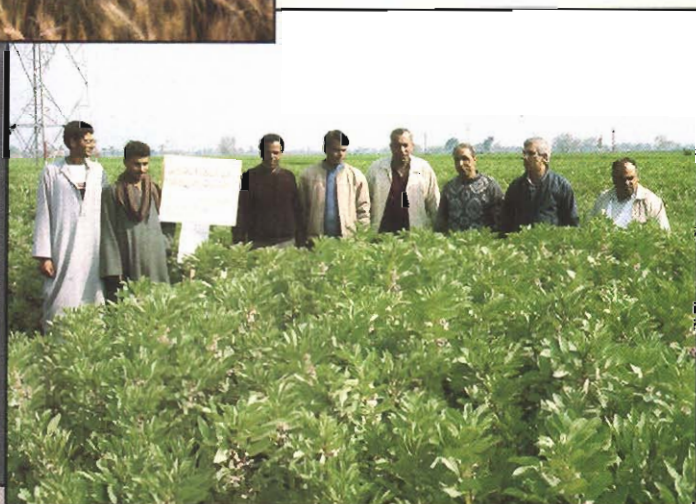
Development in average area, production and yield of faba bean over three periods in Egypt

Wheat Production Indices in Egypt according to Agro-Ecological Zones in 1980-1993 (1980 = 100%)





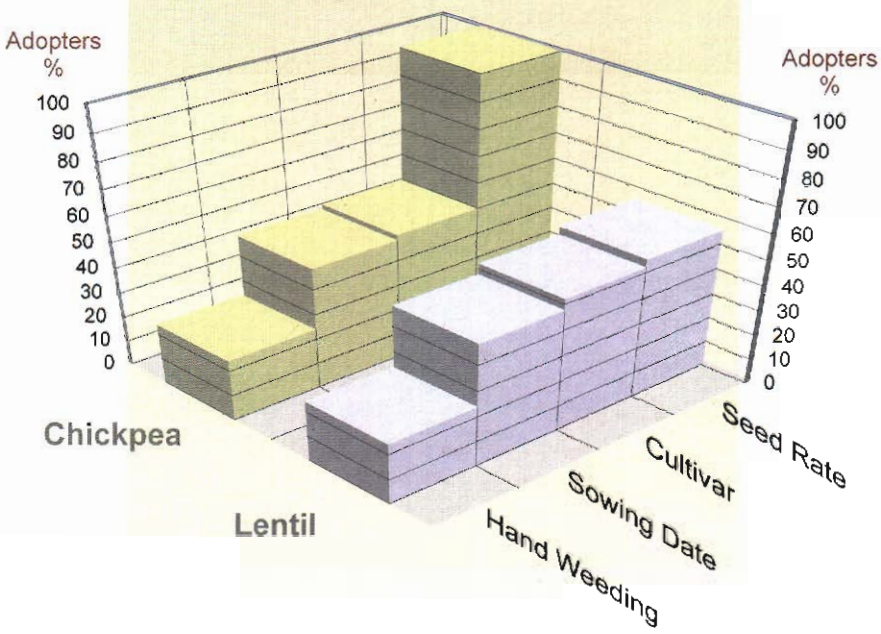
△  
◀ Demonstration fields in Egypt  
▼



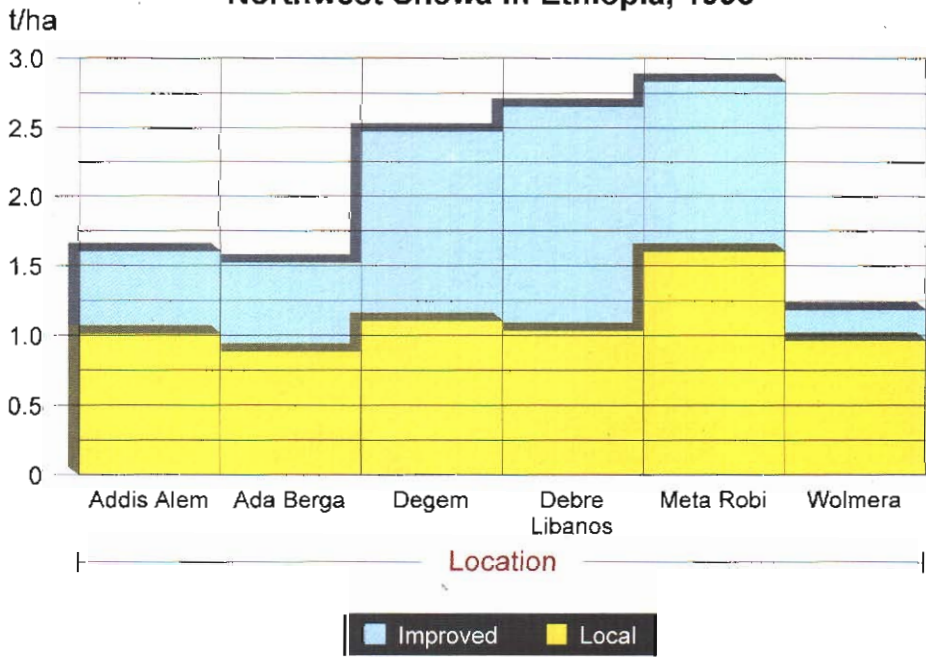
Ethiopia

Improved faba bean production packages in Ethiopia have been demonstrated to boost yields and monetary benefits to farmers. Recommended practices were adopted by target farmers in the central zone of Ethiopia. Adoption levels for chickpea and lentil improved technologies were similarly substantial. Developments in barley technology have been reflected in high yield improvements with demonstration plots.

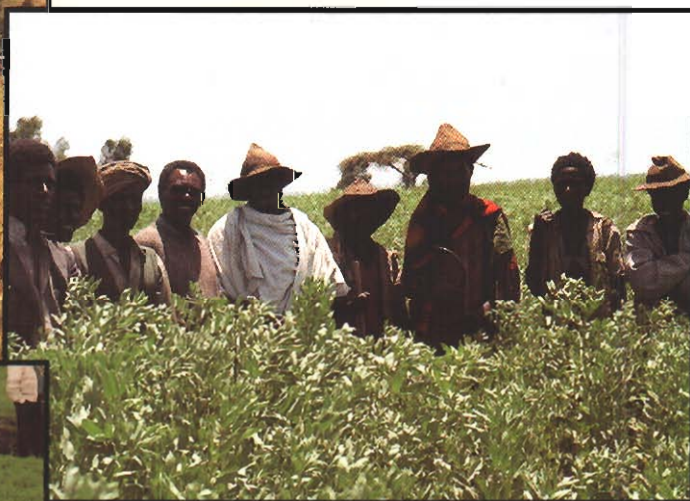
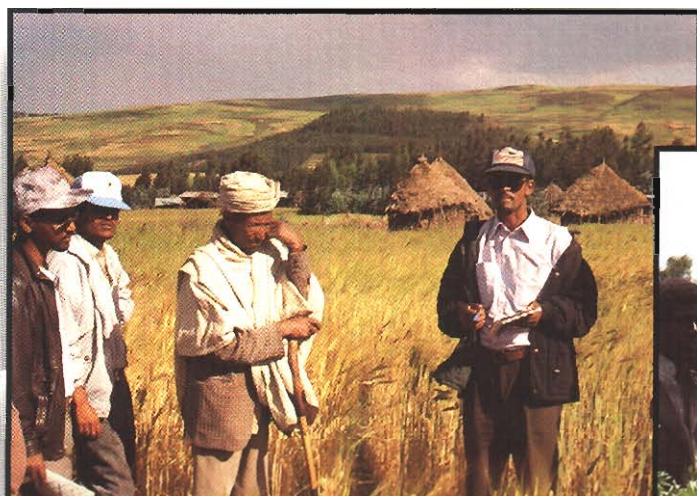
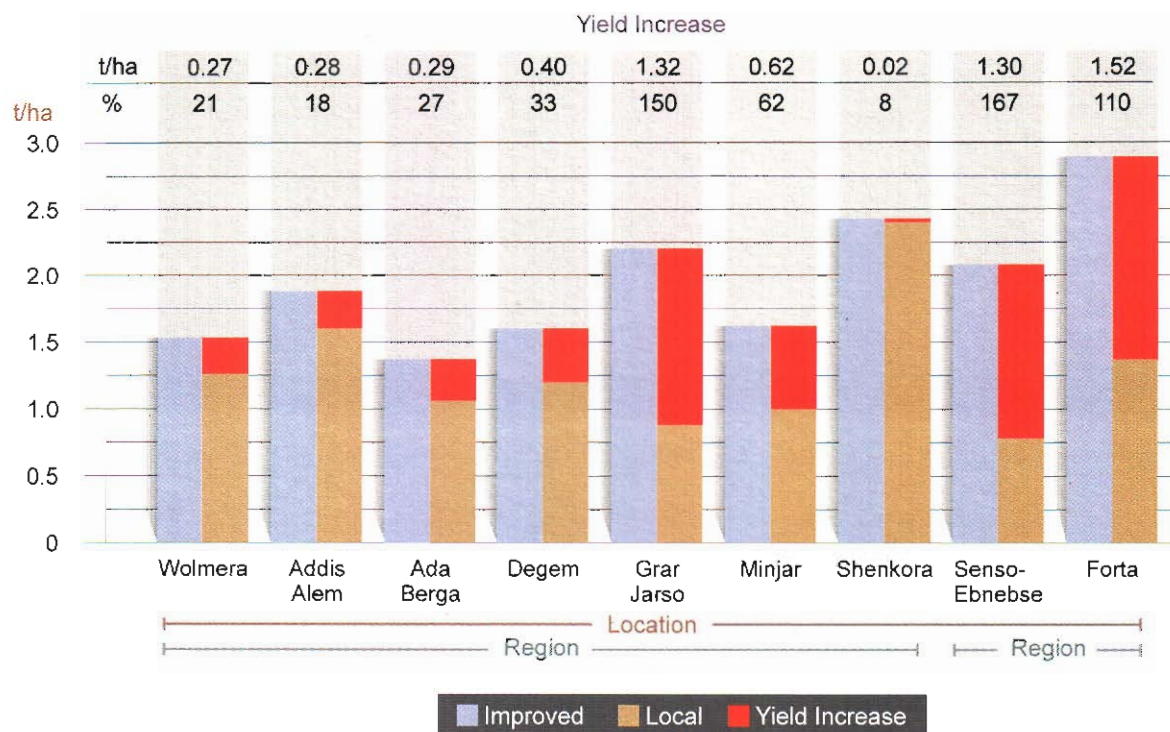
**Adoption Levels of Components of Improved Chickpea and Lentil Production Packages in Akaki Area in Ethiopia, 1992**



**Yield Performance of Production Packages (Improved) and Farmers' Practices (Local) in Barley at Different Locations in West and Northwest Shewa in Ethiopia, 1993**



### Comparison of Faba Bean Production Package in On-Farm Demonstration Plots (Improved) and Farmer's Practices (Local) in Two Regions in Ethiopia, 1993

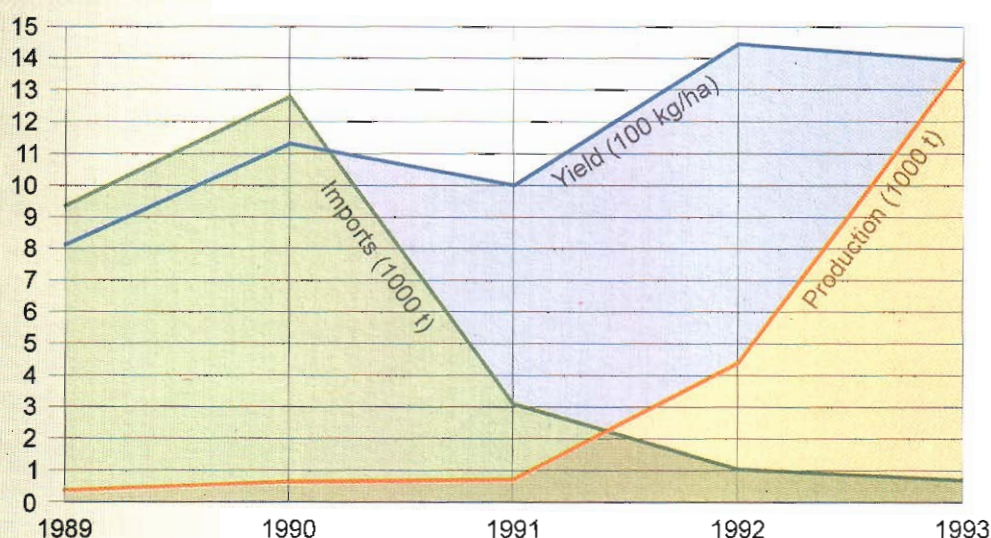


Demonstration fields in Ethiopia

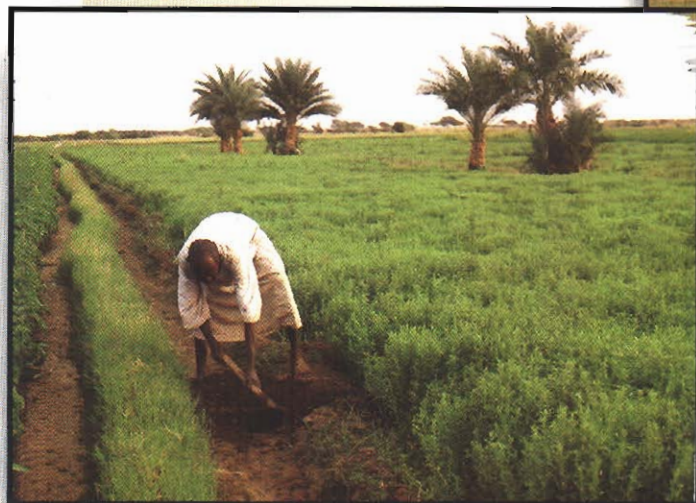
## Sudan

Wheat improvement in the Sudan provides a striking example of the impact of technology transfer. High and profitable wheat yields of demonstration plots have encouraged pursuit of self-sufficiency. The 1991/92 season witnessed high vertical expansion when production was enough to cover domestic needs for the first time. Adoption levels of improved wheat technology components in various production areas were substantial, resulting in a rising trend of wheat production. Significant strides have also been made in lentil production, largely due to technology development and government policies. With encouraging yields, production has been boosted to reach self-sufficiency while imports have been simultaneously reduced.

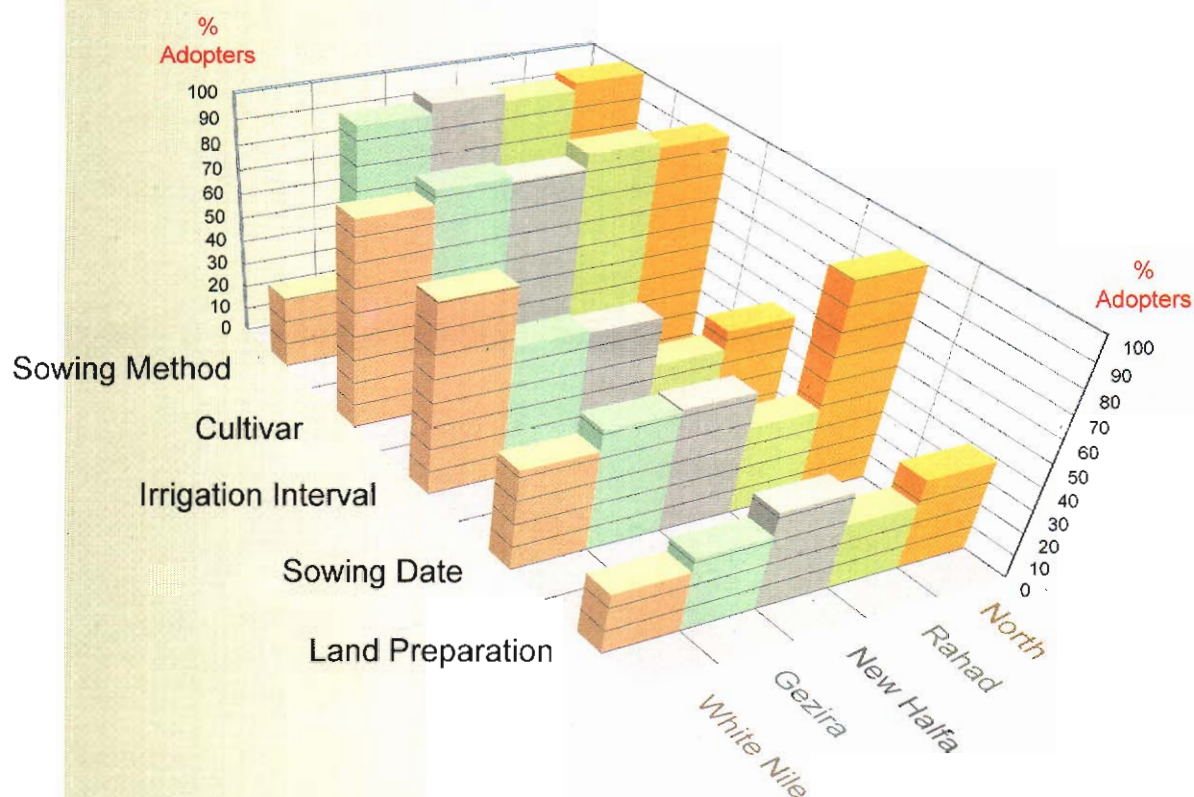
**Changes in Production, Imports and Average Yield of Lentil in the Sudan, 1989 to 1993**



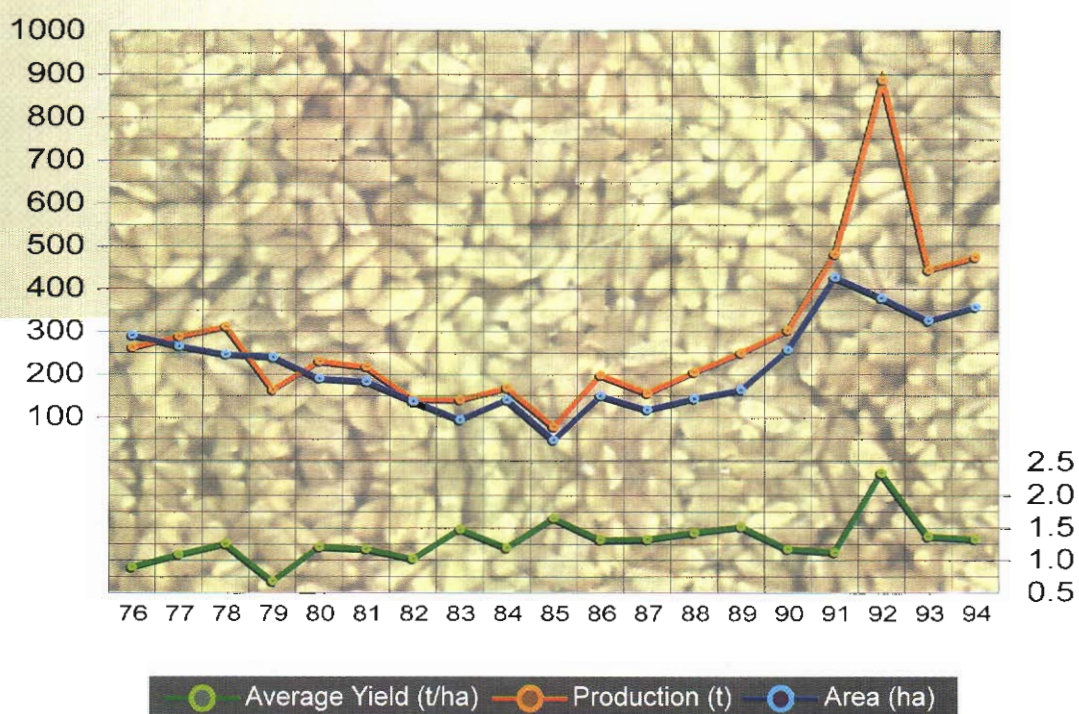
Demonstration fields in the Sudan



### Adoption Levels of Components of Improved Wheat Production Packages in Major Production Areas in the Sudan.



### Wheat Statistics: the Sudan

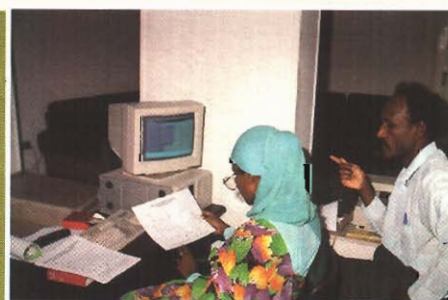


## Impact on Institutional Development

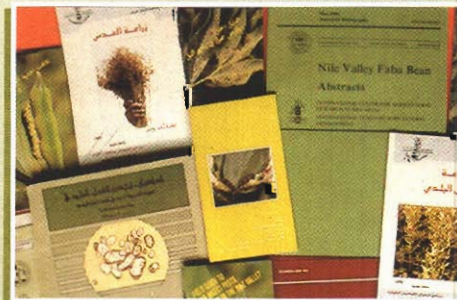
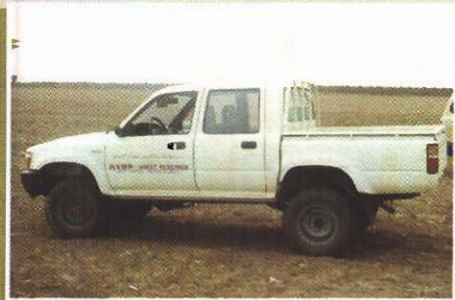
Staff education, training and professional visits, which are important components of the NVRP program, contributed greatly to the development of strong multidisciplinary research programs and institutional delivery system in the Nile Valley. For example, in 1994, a total of 59, 82 and 55 national scientists/technicians received various types of non-degree training through NVRP programs in Egypt, Ethiopia and the Sudan, respectively. A total of 204, 101 and 120 scientists from the three Nile Valley countries in the same order, participated in professional visits, workshops, coordination meetings and conferences through the support of NVRP. Training was in various specialized research disciplines including agronomy, breeding, pathology, virology, microbiology, biotechnology, entomology, physiology, seed quality, computer applications, extension, socio-economics and scientific writing. In addition, nine graduate students continued to receive support for M.Sc. degree training in breeding, soil fertility,  $N_2$ -fixation, soil-plant-water relationships, entomology and crop physiology (heat and drought resistance). NVP has also provided Ph.D. and M.Sc. training to scientists from all three Nile Valley countries.

The NVRP has contributed to upgrading field and laboratory facilities of the national programs by providing field, laboratory and office equipment. These included plot threshers, plot combines, vehicles, tractors, field implements, incubators, balances, computers, insect rearing cabinets, slide and overhead projectors and spare parts of various equipment.

NVP, and later NVRP, initiated and strengthened the links among researchers, extensionists and farmers. This provided effective approach to technology transfer which started in 1979.



Facilities provided



## Impact on Regional Cooperation

Regional cooperation has been strengthened through formal and informal networks in specific research areas (mentioned earlier) of common interest between Egypt, Ethiopia, Sudan, and ICARDA. Regional cooperation among the three participating countries involved joint planning and review of research, exchange of germplasm, technical information and improved technology, in addition to participation in regional travelling workshops and a regional coordination meetings. These networks are based on complementarity of research efforts among the three Nile Valley countries to utilize more effectively the limited human and physical resources available to National Programs.

Countries have now developed expertise in specific research areas and are currently taking a leading role with a regional network coordinator. For example, Egypt is taking the lead in screening germplasm for aphid resistance in various crops while Sudan is taking the lead in the biological control of aphids. Work on heat stress in wheat is led by Sudan while work on water efficiency is coordinated between Egypt and Sudan. Ethiopia is taking a lead in chickpea resistance to wilt/root-rot diseases. The regional travelling workshops provided good opportunities to strengthen network development in specialized research disciplines and problem-solving objectives.

Regional Travelling Workshops in Ethiopia



Inter-regional cooperation with North Africa (Tunisia)



Regional Socio-Economic Workshop