SEED UNIT

Annual Report for 1991

Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is governed by an independent Board of Trustees. Based at Aleppo, Syria, it is one of 16 centers supported by the Consultative Group on International Agricultural Research (CGIAR), which is an international group of representatives of donor agencies, eminent agricultural scientists, and institutional administrators from developed and developing countries who guide and support its work.

The CGIAR seeks to enhance and sustain food production and, at the same time, improve socioeconomic conditions of people, through strengthening national research systems in developing countries.

ICARDA focuses its research efforts on areas with a dry summer and where precipitation in winter ranges from 200 to 600 mm. The Center has a world responsibility for the improvement of barley, lentil, and faba bean, and a regional responsibility—in West Asia and North Africa—for the improvement of wheat, chickpea, and pasture and forage crops and the associated farming systems.

Much of ICARDA's research is carried out on a 948-hectare farm at its headquarters at Tel Hadya, about 35 km southwest of Aleppo. ICARDA also manages other sites where it tests material under a variety of agroecological conditions in Syria and Lebanon. However, the full scope of ICARDA's activities can be appreciated only when account is taken of the cooperative research carried out with many countries in West Asia and North Africa.

The results of research are transferred through ICARDA's cooperation with national and regional research institutions, with universities and ministries of agriculture, and through the technical assistance and training that the Center provides. A range of training programs are offered extending from residential courses for groups to advanced research opportunities for individuals. These efforts are supported by seminars, publications, and by specialized information services.

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jointly financed by

The Government of the Netherlands
The Government of Germany

and

The International Center for Agricultural Research
in the Dry Areas (ICARDA)
P.O.Box 5466, Aleppo, Syria

This report was written and compiled by program scientists and represents a working document of ICARDA. Its primary objective is to communicate the season's research results quickly to fellow scientists, particularly those within West Asia and North Africa, with whom ICARDA has close collaboration. Due to the tight production deadlines, editing of the report was kept to a minimum.

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Box 5466, Aleppo, Syria

ICARDA-016/1000/Feb 1992

CONTENTS

List of Abbreviations

ARC	: Agricultural Research Center, Giza, Egypt
CAS	: Central Administration for Seed, Giza, Egypt
CP	: Cereal Program, ICARDA
CRZ	: Center for Variety Research and Seed Technology, Wageningen, The Netherlands
DUS	: Distinctness, Uniformity and Stability Experiment
ESC	: Ethiopian Seed Corporation, Addis Ababa, Ethiopia
FAO	: Food and Agriculture Organization
GECT	: General Establishment for Cereal Trade, Syria
GOSPS	: General Organization for Seed Processing and Silos, Syria
GOSM	: General Organization for Seed Multiplication, Syria
GRU	: Genetic Resources Unit, ICARDA
GTZ	: German Agency for Technical Cooperation
IAC	: International Agricultural Center, Wageningen, The Netherlands
ICARDA	: International Center for Agricultural Research in the Dry Areas, Aleppo, Syria
LP	: Legume Program, ICARDA
LTGT	: Long-term Group Training
MSU	: Mississippi State University, Seed Technology Laboratory, Mississippi, USA
NARP	: National Agricultural Research Project, Egypt
NCARTT	: National Center for Agricultural Research and Transfer of Technology, Jordan
NSQCRC	: National Seed Quality Control Research Center, Kenya
PFLP	: Pasture, Forage and Livestock Program, ICARDA
SU	: Seed Unit, ICARDA
UoJ	: University of Jordan, Jordan
UNDP	: United Nations Development Program
WANA	: West Asia and North Africa

1. INTRODUCTION

To strengthen seed programs in West Asia and North Africa the Governments of the Netherlands and the Federal Republic of Germany are funding ICARDA's Seed Unit (project: "Development of National Seed Production Organizations in West Asia and North Africa." The objective of the unit is to strengthen national seed production organizations in West Asia and North Africa through: (1) training of regional seed production staff, (2) building up seed production infrastructure in the countries of the region, (3) making available limited quantities of high-quality seed of cereals, food legumes and medics for national programs, (4) dissemination of information, and (5) carrying out regional seed technology research.

Chapter 2 describes the activities aiming at strengthening the infrastructure for seed production. Chapter 3 summarizes the research work carried out, while Chapter 4 discusses the activities that are carried out to develop trained manpower for the WANA region. Chapter 5 and 6 describe respectively the seed multiplication and seed quality control activities, while Chapter 7 summarizes the services carried out by the unit.

1.1. Cooperation with University of Jordan (UoJ)

In 1991 the cooperation with the UoJ has been excellent. The university has shared the training load with ICARDA's Seed Unit; two regional courses (Seed certification and Seed testing) and one in-country course (Legume seed production) were carried out in the Seed Technology Laboratory of the UoJ. The university's facilities were extensively used and its academic staff participated in the lectures and practicals of the courses. The financial contribution from GTZ's seed project is acknowledged; without this support the cooperation could not have been realized.

The cooperation with the UoJ is expected to strengthen in the future and be extended to joint supervision of M.Sc. students carrying out research in seed science and technology. Also the seed survey that was initiated in 1990 is expected to be analyzed by students of the UoJ.

1.2. Cooperation with International Agricultural Center (IAC), the Netherlands

Cooperation with the International Agricultural Center in Wageningen, the Netherlands has been strengthened. Not only is the head of the unit participating in the International Course on Seed Production and Seed Technology, but curricula have been developed for a number of joint international courses. Examples of such courses are the courses on Variety Testing, Seed Quality Control Management, and Seed Health. Such courses are international courses and participants are expected to be self financed. The first International Course will be organized on Variety Testing in 1992 in Morocco.

1.3. Cooperation in Egypt

The cooperation in Egypt is typical for the manner in which the Seed Unit tries to train national staff and strengthen seed production infrastructure.

Initially ICARDA managed and financed courses and infrastructure strengthening activities, but due to the cooperation between all parties involved in the improvement of the national seed program, the costs of all activities are shared. Generally ICARDA finances its participating staff and training materials, GTZ finances boarding and lodging, and the national program take care of all logistics and transport. This approach to conducting courses and infrastructure strengthening activities is most efficient and effective. In Egypt several new approaches have been initiated, which were subsequently used in other countries.

2. BUILDING UP SEED PRODUCTION INFRASTRUCTURE

Many countries in the region still have weak seed production infrastructure. In 1991, the unit has contributed to the buildup of infrastructure through: (1) roundtable discussions, (2) assistance in preparing morphological variety descriptions, (3) assistance in carrying out post-control plots, (4) seed surveys, and other activities.

2.1. Roundtable Discussions

Roundtable discussions are meetings with subject matter specialists; they emphasize one aspect of the seed program. They have been very successful in Egypt. Attempts to initiate such discussions have been less successful in other countries. In 1991 six roundtable discussions were held.

Lot Number System, June 15 and November 11, 1991, Egypt

The objective of this roundtable discussion was to develop a new, comprehensive and simplified lot number system which can be applied to the entire country, covering all seed from both public and private sector. A lot number system for all seed lots is essential to monitor the seed production system; it will enable the seed production organization to easily trace back all important information of a seed lot. During the first meeting several proposals were made and a system was finalized in the second meeting. During the first meeting the Roundtable group also made recommendations on sampling, lot size, and stacking. The Under-secretary for Seed was requested to take the necessary steps.

Variety Descriptions, June 16 and November 11, 1991, Egypt

Morphological variety descriptions are essential for variety maintenance, field inspection, and seed inspection. The objective of the roundtable discussion was to

review the situation regarding varietal descriptions and to initiate measures that will lead to: (1) official publication of varietal descriptions, (2) standardized methodology for morphological variety description, (3) preparation of manuals with varietal characteristics for use by field inspectors.

The main purpose of the June 16 meeting was to prepare the descriptions resulting from observations taken in Sids, while the meeting on November 11 centered on the data taken in Sakha. Descriptions will be combined and published in both Arabic and English.

Legume Seed Production, June 17 and November 12, 1991, Egypt

The objective of the roundtable discussion was to discuss the improvement of the legume seed production program of Egypt with the different organizations involved in the agricultural sector. The roundtable made a large number of recommendations in the June 17 meeting regarding all aspects of legume seed production. In the November 12 meeting a start was made to prepare detailed guidelines covering all aspects of seed production for each variety of all legume crops. These should be followed exactly in producing seed, to ensure high-quality seed free from diseases.

2.2. Variety Descriptions

Assistance in morphological varietal descriptions is given to several countries of the region because they are often not made by the breeders. At ICARDA's research farm a large number of promising lines and released varieties are annually described in Distinctness, Uniformity and Stability trials. National programs can use these preliminary descriptions to initiate their own description experiments. Such descriptions can also be used for field inspection purposes. In 1990/91 the description experiment of the unit included 56, 23, 5, and 8 varieties of wheat, barley, lentil and chickpea respectively.

Furthermore, to stimulate the Syrian national program to pay more attention to morphological variety descriptions a joint description experiment with all Syrian commercial wheat and barley varieties was planted at the farm of (General Organization for Seed Multiplication) and at Tel Hadya.

At Tel Hadya an experiment was also planted aiming at preparing variety descriptions of the varieties used in the countries of the Arabian Peninsula.

The long-term group training of seed and research staff on morphological varietal description is of particular interest (refer to Chapter 4.5). This training consisted of two phases; in phase I each trainee planted his own experiment at Tel Hadya, using the varieties grown in their home country. During the second phase participants were engaged in description work of their own national wheat and barley varieties. At the end trainees prepared preliminary descriptions of wheat and barley varieties grown in their home countries.

2.3. Post-control Plots

Post-control plots are an important tool to monitor the seed production program. They are easy to implement, are relatively cheap, and provide an easy overview of all seed that is produced in the country. Assistance in carrying out post control plots for the Egyptian seed program continued in 1991. Post-control-plots are now an integral part of the seed quality control system in Egypt.

2.4. Seed Surveys

Seed surveys are an excellent tool to identify the seed quality problems experienced by the farmer. They increase the awareness of the importance of high-quality seed and the results can be used to improve the seed production programs. In 1990/91, jointly with GTZ's Seed Multiplication Project in Jordan and the National Center for Agricultural Research and Transfer of Technology (NCARTT), a survey was initiated in Jordan. The seed survey focused on wheat.

2.5. Pre-release Multiplication

In 1990 jointly with GOSM in Syria a system of pre-release multiplication was initiated; quality seed of three varieties (Nesser, bread wheat; Lahn, durum wheat; Rihane 03, barley) was produced on one hectare each. Yields were excellent and the seed was further multiplied with contract farmers of the GOSM. The variety release committee has met and released one of the varieties (Nesser). The advantage of the pre-release multiplication is that at the moment of release seed is available for farmers to grow the new variety. In general this is not the case and multiplication is started up only after the variety has been officially released.

2.6. First Egyptian National Seed Conference

The head of the unit was invited as a facilitator for the "First Egyptian National Seed Conference; a planning and organizing approach to government and private sector cooperative development, growth and improvement in supplying higher-yielding seed to farmers". The conference was financed by the USAID-funded National Agricultural Research Project (NARP) and organized by the Central Administration for Seed (CAS). The main aim of the conference was to recommend changes that are necessary for private sector participation in the seed sector. A number of countries (Thailand, Turkey and Morocco), multinational companies (Pioneer, Royal Sluis), and national companies from Egypt were invited to present their approach and views regarding privatization. A comprehensive set of recommendations was made for: (1) Improving the legislative base, (2) Improving seed policy, and (3) Developing support to the private sector.

2.7. Evaluation Mission Bangladesh

At the request of the Government of the Netherlands, ICARDA's Seed Production

Specialist carried out, in February 1991, a mid-term evaluation of the Seed Multiplication Project in Bangladesh. The terms of reference of the mission were: (1) review the ongoing project activities in the field of potatoes and oil seeds, (2) make recommendations to enhance the efficiency and effectiveness of the project activities, (3) outline a work plan for the remainder of the project period, and (4) advice on the assistance in view of the new seed policy (privatization).

2.8. Evaluation Mission Kenya

At the request of the Government of the Netherlands, ICARDA's Seed Production Specialist also carried out, in December 1991, an evaluation of the National Seed Quality Control Research Center (NSQCRC) in Kenya. The terms of reference were: (1) review the existing seed certification system with emphasis on horticultural crops, (2) review the technical administration of the seed inspectorate, (3) review the seed regulations, (4) highlight the different aspects of plant breeders rights and the consequences for the NSQCRC, (5) review the ongoing project activities and finalize the work plan for the rest of the project period, and (6) conduct a training seminar on aspects of seed quality control.

3. RESEARCH

Research aiming at solving practical seed technology problems has been carried out such as seed surveys, multiplication ratios in seed production, seed vigor, resistance of storage insects to fumigants, germination under ambient conditions, and seed renewal rates. The unit is also interested in research aimed at establishing suitable standards for seed production in developing countries.

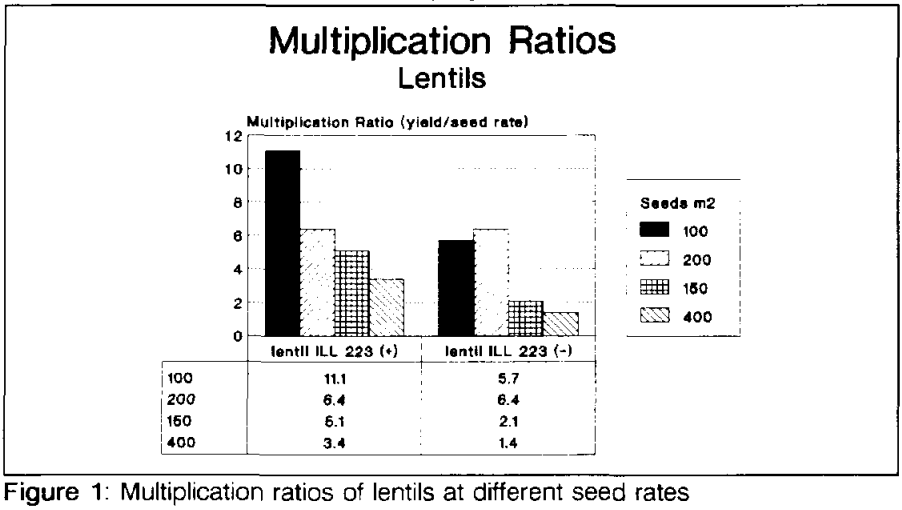

Figure 1: Multiplication ratios of lentils at different seed rates

The first proposals for cooperative research with countries in the WANA region and beyond have been prepared and are discussed with the relevant authorities.

Table 1: Effect of seed rate on multiplication factor (yields are averages of several varieties)

Seed Rate	Yield (kg/ha)	Multiplication Ratio
Wheat (Seed rate in kg/ha)		
25	4081	157
50	4907	98
75	5176	69
100	4949	49
125	5574	44
Barley (Seed rate in kg/ha)		
25	3933	157
50	5161	103
75	5122	68
100	5717	57
125	5798	46
Chickpea (seed rate in plants/m²): Yields are averages of two varieties in one year (Personal Communication; S. Silim).		
50	3123	62
40	2703	68
33.3	2557	77
25	2293	92
22.2	2244	101
Lentil (seed rate in seeds/m²): Yields are averages over two years (Personal Communication; S. Silim).		
100	1106	11.1
200	1280	6.4
150	1517	5.1
400	1347	3.4

3.1. Multiplication Ratios

Seed rate experiments and literature reviews have been carried out to assess for wheat, chickpea and lentil, the seed rate that results in the fastest multiplication ratio. As can be seen from Table 1 and Figure 1 the results are similar for all crops; the

lowest seed rate (or plant density) resulted in the highest multiplication ratio, but as expected the yield per hectare is lower at the lowest seed rate. Figure 1 shows that under suboptimum conditions (ILL 223(-); unfavorable rainfall, 240 mm) the highest multiplication ratios are still obtained at the lower seed rates. The consequence for seed organizations is that it is advisable to plant seed production fields at a low seed rate if the seed is urgently needed for the farming communities in the country. This is generally the case when a new variety is released and seed is produced for the first time.

3.2. Crop Management and Vigor

In WANA rainfall is often very unreliable and large differences in environmental conditions exist from location to location and from year to year. Very often crops are grown under harsh conditions and germination percentages are usually not a good measure to predict performance in the next generation. Seed vigor can explain to a much larger extent the differences obtained in field emergence and possible performance in the next generation.

A series of experiments was carried out to assess the influence of crop management on: (1) seed size, (2) germination and seed vigor, and (3) yielding capacity in the next season.

Wheat: In the 1989/90 and 1990/91 season seed weight, germination and seed vigor were assessed of seeds grown under different management levels. Two varieties (Cham 1 and Cham 4), which were grown under six water levels (rainfed, 20% of water balance up to 100% of water balance) and four nitrogen levels (0, 50, 100, and 150 kg/ha) were studied. The preliminary results are summarized as follows:

- There was a very clear influence on 1000-seed weight. The more water the plots received the higher the 1000-seed weight (Fig. 2A) and increased nitrogen resulted in a lower 1000-seed weight (Fig. 2D).

- The results regarding vigor of the seed were unexpected. Seed vigor, as measured by the average length of seedlings, decreased with increasing amounts of water received (Fig. 2C). Other vigor tests have been initiated to confirm this.

- There was no significant effect of the different management levels on the germination percentage (Fig. 2B & E).

To study the effects of these management levels on yield in the next generation, seeds were sown (each plot received seed on the basis of 100 kg/ha) in a triple 7x7 lattice at four different locations. Most important characters scored were initial seedling growth, plant population, and yield. The preliminary results can be summarized as follows:

- The different management levels had no significant effect on the yield in the next generation. Significant differences obtained in number of plants and number of tillers can be explained by the fact that the lower management levels were sown with seed that had a lower 1000-seed weight and consequently, because planting

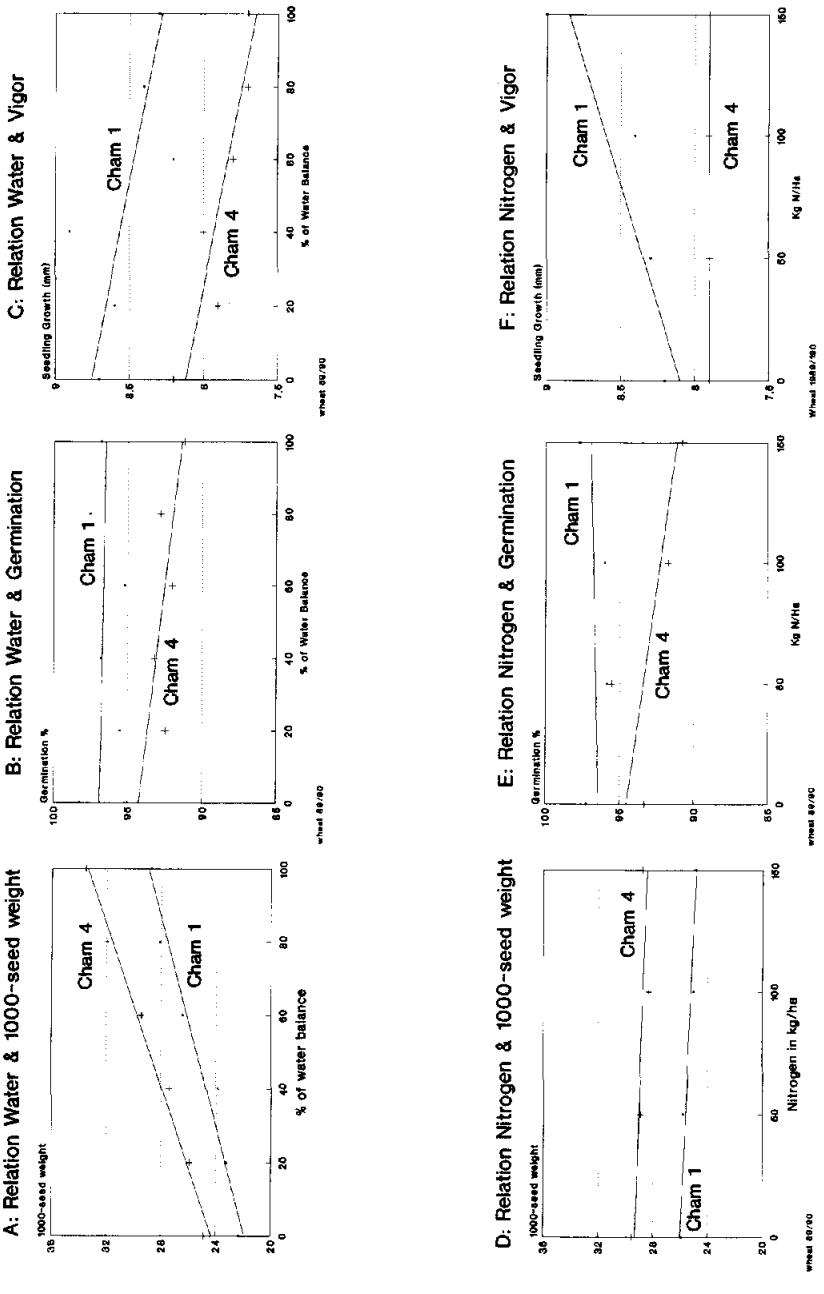

Figure 2: Influence of water level and nitrogen on 1000-seed weight, germination and vigor

was done at a standard seed rate, with more seed resulting in more seedlings.

In the 1990/91 season a rather similar experiment was planted, but the seed sown per plot was not based on a standard seed rate, but an equal number of seed was sown per plot. The results have not been statistically analyzed, but appear to be similar.

Lentil: A similar experiment was planted for lentils, using four genotypes (ILL 5582, ILL 6004, ILL 4401, and ILL 4400), three water levels (less than 200, 220-260, more than 300) and one location. Similar results were obtained.

Preliminary conclusion:

- Seed harvested from plots that received suboptimal management levels and/or environmental conditions do not lead to reduction in yield in the next generation.

- seeds with a low 1000-seed weight do not necessarily yield less than seeds with a high 1000-seed weight.

The implication for seed production organizations is that the smaller seed that is usually screened out still have a good planting value.

3.3. Phosphine Resistance

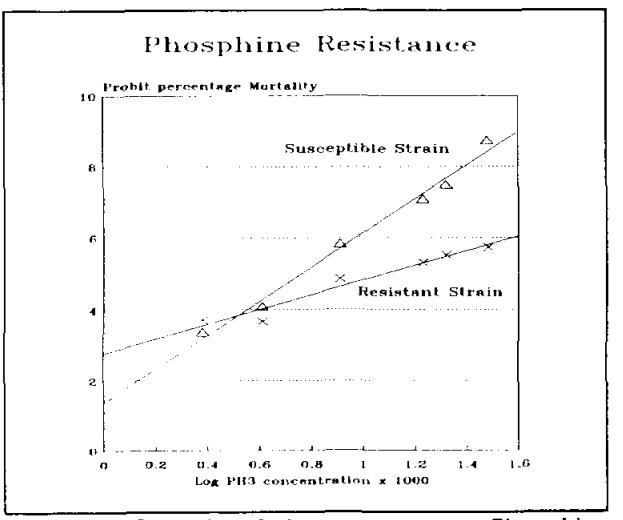

Figure 3: Example of the response to Phosphine fumigation of a resistant and a susceptible strain

Little information is available on pesticide resistance levels of storage insect pests in Syria and neighboring countries. The objective of this study is to investigate the presence, extent and cause for fumigant resistance in Rhizopertha dominica. The study also seeks to provide insight into the effects of poor fumigation practices on the buildup of resistance against a commonly used fumigant (phosphine).
Storage insects are usually well protected in or between seeds. Most insecticides are therefore not able to reach them. The exception is the fumigants due to their diffusion and penetration properties. The number of fumigants that can be used is limited and an increased tolerance to commonly used fumigants has been reported at many occasions. One of the reasons for the buildup of resistance in storage insects is the improper use of the fumigants.

Seed stores, grain stores, open area stores, silos, grain mills, and seed processing plants in and around Aleppo were sampled and the resistance of the insects to Phosphine assessed. The results, which will be presented in an M.Sc. thesis at the Cukorova University, Adana, Turkey in 1992, are summarized as follows:

- clear differences, with regard to susceptibility to the fumigant Phostoxin, exist between strains from different locations in northern Syria (see Figure 3).

- some strains are resistant and can only be killed by dosages much higher than the recommended dose.

In conclusion: the study provides valuable information with regard to Phosphine resistance versus susceptibility in Rhizopertha dominica in northern Syria. It shows that resistance to Phostoxin is present.

3.4. Monitoring Germination

As part of its task to manage the ICARDA seed store, the unit monitors germination in the store and under ambient conditions. From Figure 4 it can be concluded that even after storage of three years germination percentages are still acceptable for wheat and barley. Both under ambient conditions and in the store germination percentages do not drop below the internationally accepted standards. Similar results have been obtained in lentil and chickpea.

Also included in Figure 3 is Cham 3 (a durum wheat variety). This variety is showing a significant drop in germination after storage of nine months. The reason for this drop in germination is not known and is investigated.

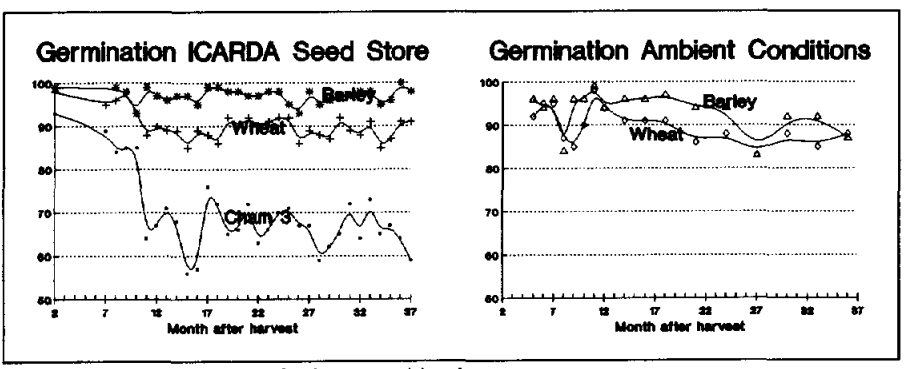

Figure 4: Germination of wheat and barley

3.5. Renewal Rates

A study was carried out to investigate the effect of seed source on seed quality and yield in wheat. Farm-saved seeds (up to six years) from different farmers and Certified

Seed from a national program were compared. Preliminary results indicated progressive deterioration of genetic and physical quality for seeds kept by the farmers for longer periods. There was no significant difference in germination of farm-saved and certified seeds. Lack of sufficient quantity of seed and seed lots from different years and sources made a replicated trial unpractical. To make a sound statistical study of the problem a nationwide or region based seed survey should be organized.

4. TRAINING OF REGIONAL SEED PRODUCTION STAFF

Although a substantial number of staff members of the WANA region has been trained in the courses conducted by the unit, there is still a need to continue the training efforts because the seed programs of the region still suffer from a lack of trained manpower. Moreover, the training in ICARDA's Seed Unit is unique, because it is mainly conducted in the Arabic language. Table 2 and 3 show the number of trainees that participated in the seed courses; ANNEX I summarizes the training activities of 1991.

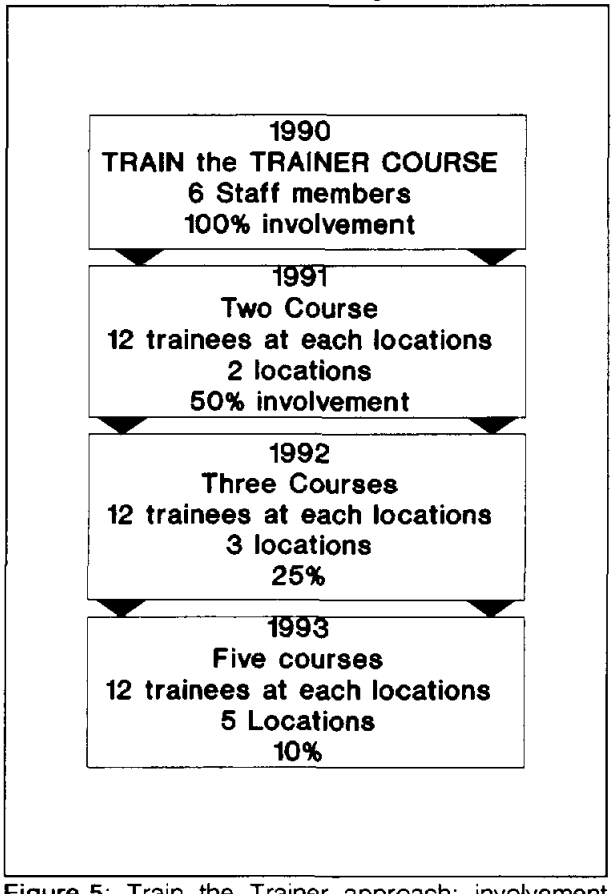

Figure 5: Train the Trainer approach; involvement means involvement of CAS, ARC, GTZ, NARP and ICARDA staff

4.1. Train the Trainer

To reduce involvement in training without reducing the number of staff that is annually trained, the unit initiated a Train the Trainer approach. One Train the Trainer course was successfully held at the in-country level in Egypt in 1990. Seven staff members from the Central administration for Seed (one each from Behera, Beni Sueif and Dakalia and two each from Giza and Kafr El Sheikh governorate) were trained for a period of one week in the methodology for field inspection of seed fields. The trainers came from CAS,

Table 2: Regional staff trained in ICARDA's seed courses

Country	Number of Trainees						
	1982-1985	1985-1987	1988	1989	1990	1991	Total
Afghanistan	1	1	-	-	-	2	4
Algeria	1	3	-	9	11	2	26
Cyprus	-	-	-	1	1	1	3
Egypt	3	34	46	30	13	46	172
Ethiopia	-	6	25	1	2	6	40
India	1	-	-	-	-	-	1
Iran	4	1	-	-	2	1	8
Iraq	-	2	-	-	-	-	2
Jordan	7	2	-	4	5	22	40
Kuwait	-	-	-	1	1	-	2
Lebanon	1	-	-	3	3	5	12
Libya	-	1	-	-	5	7	13
Morocco	5	2	-	11	6	2	26
Oman	-	-	-	-	2	-	2
Pakistan	-	-	-	1	-	-	1
Saudi Arabia	-	2	-	-	-	-	2
Somalia	2	1	-	-	-	-	3
Sudan	2	8	-	2	3	3	18
Syria	6	24	3	6	15	22	76
Tunisia	2	3	-	5	3	2	15
Turkey	-	-	-	1	1	4	6
Yemen (North)	-	2	23	4	-	-	29
Yemen (South)	2	3	-	2	19	-	26
Yemen (Rep.)	-	-	-	-	3	4	7
Uganda	-	-	-	-	1	1	2
UA Emirates	-	-	-	-	-	1	1
ICARDA (GRU)	-	-	-	2	1	1	4
	37	95	97	83	97	132	541

GTZ, ARC, NARP Seed Component and from ICARDA. The theoretical background of the field inspection methodology was discussed in-depth and practical field inspections were carried out.

The trainers (the six 1990 trainees) were fully responsible for overall organization of two courses in 1991. They delivered the majority of the lectures and practicals. CAS, GTZ, ARC, NARP Seed Component and ICARDA staff participated as observers. For

Table 3: Seed production staff of different organizations trained in ICARDA's seed courses.

Organization	Number trained					
	up to 1985	1985-1987	1988	1989	1990	1991
NARCs	19	21	22	27	35	39
IARCs	2	3	1	2	1	1
NSPOs	16	67	74	53	61	91
SCs		4	1			1
Total	37	95	97	83	97	132

NARC = National Agricultural Research Center; IARC = International Agricultural Research Center; NSPO = National Seed Production Organization; SC = Seed Company.

1992 three courses have been planned. The two 1991 courses were organized from 6-11 April, 1991 in Egypt at two locations i.e. Sids (Upper Egypt) and Sakha (Delta). A total of 22 trainees from 13 governorates participated in the courses i.e. 12 and 10 at Sakha and Sids respectively. The course was sponsored by CAS, GTZ's Egyptian Seed Project, and ICARDA's Seed Unit.

4.2. Headquarter Courses

Seed Health Testing, March 17 - 28

The objective of the course was to train participants in standard methods used to detect fungal pathogens in seed. Practicals dealt mainly with fungi in seed, which represent about 80% of all seed-borne pathogens. The course was held at Tel Hadya with ten participants from seven countries, including three staff members from the Aleppo quarantine office. The majority of the participants are working in seed health testing in their national programs or are about to start health testing activities. It was the first regional seed health testing course.

Seed Processing, June 30 to July 11

The headquarter Seed Processing and Storage course was conducted from June 30 to July 11, 1991. The objective of the regional course was to train participants in seed processing (principles, machines, adjustments, management, maintenance, spare parts) and related topics (seed storage, storage pests, spraying, fumigation).

Considerable time was spent in the seed plant and processing laboratory for practicals in cleaning and treating of cereals, legumes and forage crops. In addition visits were made to seed plants of the General Organization for Seed Multiplication (GOSM) and to the General Establishment for Cereal Trade (GOCT). KAMAS seed processing equipment company participated in the lecturing and practicals.

A total of 19 participants from nine countries attended the course. The majority of the participants are working in the national seed program and/or research activities in their home countries.

4.3. Regional Courses

The unit is decentralizing its training activities and the Seed Technology Laboratory of the University of Jordan (UoJ) has become a partner in the training activities. The International Agricultural Center in the Netherlands is also expected to be a partner in 1992 and beyond.

Seed Certification, April 28 - May 7, Amman, Jordan

The regional Seed Certification course was conducted from April 28 to May 7, 1991. The course was organized in close cooperation with GTZ's Jordan-Germany Seed Multiplication Project and the UoJ. The objective of the course was to train participants in uniform and reliable field inspection methodology for accurate assessment of seed quality in the field. Considerable time was devoted to practical field inspection. Several trips were made to research stations and farmers fields to inspect Basic and Certified Seed. Different field inspection methodologies were used and the results were compared and their merits discussed. A total of 14 participants from ten countries attended the course. The majority of the participants are involved in seed production and/or seed certification related activities in their home countries. The course was funded by GTZ's Jordan-Germany Seed Multiplication Project and ICARDA's Seed Unit.

Seed Testing, October 20 - 31, Amman, Jordan

The regional Seed Testing course was conducted from October 20-31, 1991 in Amman, Jordan. The course was organized in close cooperation with GTZ's Jordan-Germany Seed Multiplication Project and the UoJ.

The objective of the course was to train participants in modern laboratory seed testing techniques for accurate assessment of seed quality. Lectures covered various aspects of seed quality and related topics. ISTA rules and regulations were used as a basis for lectures and practicals. More time was devoted to practical seed testing of cereals and legume crops. The tests included physical and genetic purity, germination, TZ test (viability), vigor test and demonstration on seed health.

A total of 18 participants from 11 countries of the WANA region and one participant from East Africa attended the course. Most of the participants are involved in seed production and/or seed quality control related activities in their home countries.

The course was funded jointly by the GTZ supported Jordan-Germany Seed Multiplication Project and ICARDA's Seed Unit.

4.4. In-country Courses

The unit is giving more emphasis to in-country training courses, because it is felt that training under local conditions is more effective than when courses are conducted at ICARDA headquarters.

Legume Seed Production, April 28 - May 7, Amman, Jordan

The in-country Legume Seed Production course was conducted from April 28 to May 7, 1991. The course was organized in close cooperation with GTZ's Seed Multiplication Project in Jordan, the University of Jordan, and ICARDA's Legume Program. The course was designed to give a general overview of variety development, evaluation, release, description and maintenance as well as seed production, processing, storage and quality control of food legume crops. Emphasis was given to identification and detection of seed-borne diseases of economic importance during field inspection and laboratory testing. Although it was an in-country course 12 trainees from four countries participated; seven from Jordan, two from Lebanon, two from Syria and one from Turkey. Participants are working in the agricultural research systems or in the seed program of the respective countries. The course was funded by GTZ's Jordan-Germany Seed Multiplication Project and ICARDA's Seed Unit and Legume Program.

Seed Processing, November 9 - 24, Sakha, Egypt

The in-country Seed Processing course was conducted from November 9-24, 1991 in Egypt. It was organized on the request and in close cooperation with the Central Administration for Seed (CAS), GTZ Seed Improvement Project in Egypt, and ICARDA's Seed Unit.

The objective of the course was to train participants in seed processing with emphasis on machine operation and adjustment for efficient and effective use of cleaning capacity consistent with high seed quality. In addition a number of seed processing and storage related topics and laboratory seed testing methods were also discussed. Considerable time was devoted to practical seed cleaning and adjustment of different machines to clean cereals, legumes and forage seeds. To demonstrate the relationship between processing and improvement in physical and physiological quality of seed, each participant had taken samples and carried out the quality tests after adjustments of each machine individually. During the course study tours were made to processing plants and private seed companies where the participants were exposed to different makes of machines and plant layouts. Bulk handling, drying, cob selection, shelling, cleaning and grading of seed maize was demonstrated in Pioneer's seed plant and the processing line for vegetable seeds was demonstrated in the facilities of the National Seed Company.

A total of 16 participants: 14 from Egypt and two from Ethiopia participated in the

course. The majority of the participants is responsible for seed processing activities as managers, engineers and technicians in their respective regions/countries. The course was funded jointly by GTZ's Seed Improvement Project in Egypt and ICARDA's Seed Unit.

4.5. Long-term Group Training (LTGT)

In 1990/91 two LTGT courses were organized i.e: (1) on morphological variety description, and (2) on general seed production, both for a period of 3-4 months.

Morphological Variety Description

This specialized Long-term Group Training was organized for staff from national agricultural research systems and for seed program staff who require in-depth practical skill in variety description. A total of five trainees from Egypt, Jordan and Syria stayed with the Seed Unit for 3.5 man-months in two phases.

In phase one, trainees came to ICARDA for a period of one month from mid-November to mid-December, 1990. They were exposed to the theoretical background of variety description based on UPOV guidelines and participated in field layout, design and planting of the Seed Unit's Distinctness, Uniformity and Stability (DUS) experiments. They also carried out laboratory practicals to study seed and seedling characters for variety identification. Each trainee planted, at Tel Hadya, his own DUS experiment, using the varieties grown in their home country.

During the second phase of the training (April-June, 1991) participants were fully engaged in description work of their own national wheat and barley varieties, both in the field and the laboratory. A large number of morphological characters were scored or measured to be used for description work.

A two-week training was given by a consultant on application of statistics for variety description experiments. Sufficient time was spent on practicals which will enable the trainees to initiate variety description work in their home countries. At the end trainees prepared preliminary descriptions of wheat and barley varieties grown in their home countries.

General Seed Production

The general LTGT was organized to acquaint mid-level seed program personnel with seed production, processing and quality control activities and its relationship with other disciplines so that they have a broader out-look on the different components of the seed industry. The training was carried out from March to June, 1991 with 5 participants from Egypt, Ethiopia and Syria. During the first month the training was coordinated with the Cereal Program (CP) for a general background on variety development and field experimentation. Trainees were exposed to different aspects of the seed program, i.e; varietal maintenance and variety description, seed production, seed processing, seed storage, and seed quality control.

Study visits were arranged to different organizations to acquaint the trainees with the seed production and supply system in Syria and to compare and contrast with their own program. Visits to contract seed growers and practical field inspection were organized through the GOSM; seed storage and fumigation with General Establishment for Cereal Trade (GECT); and seed cleaning with General Organization for Seed Processing and Silos (GOSPS). Trainees were assigned a small research projects (in the seed processing and/or the seed testing laboratory). An attempt was also made to let trainees conduct a small literature review on subjects of particular interest. Language problems made this exercise difficult.

4.6. Individual Trainees

Several staff members of national programs have been trained in the facilities of the unit:

- A staff member from the Agricultural Research Center in Libya was trained (one week) in morphological variety descriptions.
- A staff member from the Ministry of Agriculture in Jordan was trained (two weeks) in seed health testing.
- Four staff members from the region (one each from Morocco and Libya and two from Syria) were trained (one week) in medic seed processing.
- Three staff members from Syria were trained (one week) in germination testing.

4.7. Course Participation

In addition to the participation of the head of the unit in the International Course on Seed Production and Seed Technology in Wageningen, the Netherlands, Seed Unit staff lectured in the following courses at ICARDA: (1) Insect Control in Food Legume and Cereal Crops, (2) Advanced Breeding Methodology for Food and Feed Legumes, and (3) Long-term Group Training Course for Cereals.

5. SEED MULTIPLICATION ACTIVITIES

5.1 Production and Processing

The unit is multiplying seed of lines and varieties which are promising in one or more countries of the ICARDA region. The seed multiplication activities at ICARDA's research farm are also carried out as an integral part of the Seed Unit's training activities.

Annually Breeder Seed, Pre-basic Seed, Basic Seed and Quality Seed of wheat, barley, lentil, chickpea and medic is produced, cleaned, and -where necessary- treated. The amounts of Breeder, Pre-basic, Basic and Quality Seed produced in 1991 are indicated in Table 4. Breeder Seed was produced of 20 different varieties. Pre-

basic Seed, Basic Seed and Quality Seed was produced of 18, 27 and 25 different varieties respectively. The total amount of seed produced was just under 40 tons.

5.2 Distribution of Seed

The Breeder Seed and the Pre-basic Seed is kept for next year's multiplication, while the Basic Seed and the Quality Seed is for distribution.
Of the total amount distributed (Table 5), 9.4, 8.5 and 1.4 tons are respectively distributed to the region, used for research experiments and planted by Station Operations at the ICARDA farm. Two hundred kilo of lentils were given to the Syrian Seed Organization.

Table 4: Quantity (tons) of seed harvested per multiplication category; figures include wheat, barley, chickpea, lentil and Medics

	1988		1989		1990		1991	
	No vars	Prod	No vars	Prod	No vars	Prod	No vars	Prod
Breeder Seed	25	1.5	25	0.4	23	0.3	20	0.5
Pre-basic Seed			24	6.1	44	8.7	18	6.8
Basic Seed					6	4.3	27	17.0
Quality Seed	43	79.0	41	25.0	37	7.4	25	14.5
Total		80.5		31.5		20.7		38.8

6. SEED QUALITY CONTROL ACTIVITIES

The seed quality control laboratory of the unit is, in addition to the role it plays in training, to a large extend used to monitor the seed production, seed processing and seed storage activities of the unit. As the research activities of the unit have been increasing over the past few years a clear increase in the number of tests can be seen. In 1991 a total of 2596 tests have been carried out (Table 6) and of these 3% was for training purposes, 34% for monitoring seed production activities, and 62% for research.

Table 5: Distribution of seed (in kgs) in 1991

	Wheat	Barley	Lentil	Chickpea	Total
Seed Unit	985	1075	100	1000	3160
Region		8200	100	1100	9400
GOSM			200		200
Research	4735	2100		1640	8475
ICARDA Farm		700		700	1400
Total	5720	12075	400	4440	22635

Table 6: Number of samples tested in the seed testing laboratory

	1988	1989	1990	1991	Total
Physical purity	158	283	149	28	618
Germination	290	822	531	1069	2712
Varietal purity	304	165	178	117	764
Moisture	8	148	178	143	477
Vigor			21	356	377
Seed weight			802	883	1685
Total	760	1418	1859	2596	6633

7. SERVICES

A small part of the activities of the unit is dedicated to serve ICARDA commodity programs. This service consists of: (1) cleaning and treating of seed in the unit's seed processing plant and assisting cleaning of breeders' samples in the unit's seed cleaning laboratory, (2) carrying out seed quality tests, and (3) managing the ICARDA central store. Furthermore, some ICARDA staff has been trained in regular seed courses.

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7.1. Seed Processing

The Large Cleaning Equipment

In addition to cleaning and treating the harvest of all seed multiplication fields of the unit, the seed processing plant has been extensively used to clean seed lots of commodity programs and of the Syrian Seed Organization (GOSM). Information on the amount of seed cleaned for the different programs and for GOSM is given in Table 7. The amount of seed cleaned and, if necessary treated in 1991 was 371 tons compared to 207.9 tons in 1990 and 70.4 tons in 1989. The large increase is mainly because the service to commodity programs increased from 38.9 in 1989 to 110.3 tons in 1991. The amount processed for the GOSM doubled when comparing 1990 and 1991.

Table 7: Seed processed since 1988.

	1988	1989	1990	1991
Seed Unit	80.6	31.5	20.8	42.0
Wheat	36.2	13.2	7.9	9.1
Barley	32.5	15.9	7.0	26.2
Lentil	1.1	0.2	0.4	1.5
Chickpea	7.8	1.8	3.1	5.2
Medic	3.0	0.4	2.5	
Services	52.3	38.9	78.8	110.3
CP		1.6	5.8	0.3
PFLP	10.5	6.5	16.7	18.1
LP	3.1	4.3	1.8	8.9
FRMP	16.2	20.1	25.5	35.4
Station Operations	21.6	6.4	29.0	47.6
Others	0.9			
Service to GOSM			108.3	218.7
TOTAL	132.9	70.4	207.9	371.0

The Small Cleaning Equipment

In 1990 the seed cleaning laboratory was equipped with a large number of laboratory-

scale seed cleaning machines i.e: air-screen cleaner, indented cylinder, gravity table, brushing machine, de-awner, spiral separator, belt grader, magnetic separator, aspirator, and velvet roll. This equipment played an important roll in the training activities of the unit. Special jobs carried out with the laboratory-scale cleaning equipment during 1991 were:

- GRU cleaned 2820 samples of barley, 304 samples of wheat, 1925 samples of chickpea and ten samples of lentil.
- CP cleaned 3750 samples of barley and 90 samples of wheat.
- PFLP cleaned three samples of barley, 18 samples of chickpea, 20 samples of lentil and 16 samples of medics
- FRMP cleaned 190 samples of barley.

All these samples were cleaned by program staff under supervision of SU staff.

7.2. Seed Testing

The unit's seed testing laboratory plays an important role in all seed prodution activities. Table 6 shows the quality tests carried out for the unit's research and seed production activities. The laboratory is also used by other programs; the laboratory was used for germination of approximately 2000, 10, 100, 300, and 10 samples for PFLP, LP, CP, GRU/LP and Station Operations respectively.

8. PERSONNEL AND CONSULTANTS

The organogram of the unit is presented in Figure 6. Personnel during Phase II was:

Dr. A.J.G. van Gastel	Head of unit
Mr. Zewdie Bishaw	Seed production specialist
Mrs. Maha Kabbani	Secretary
Mr. Abdul Aziz Niane	Senior research technician
Mr. Gazi Jabri	Research technician (quality control)
Mr. Naim Azrak	Research technician (processing)

Consultants

Ir. Henk Koster	Wageningen, the Netherlands (May '91 and Sept'91)
Mr. Thomas Edholm	KAMAS Seed Processing Equipment Company, Sweden (June '91)
Mr. Ziad Kayali	Establishment for Cereal Trade, Aleppo, Syria (June '91)
Dr. Ahmed Abu El Gassim	Director General National Seed Administration, Khartoum, Sudan (October '91)
Dr. Serpil Konosor	Entomologist, Cukorova University, Adana,

Turkey (November '91)
Mr. N. Istifan Private Consultant, Aleppo, Syria

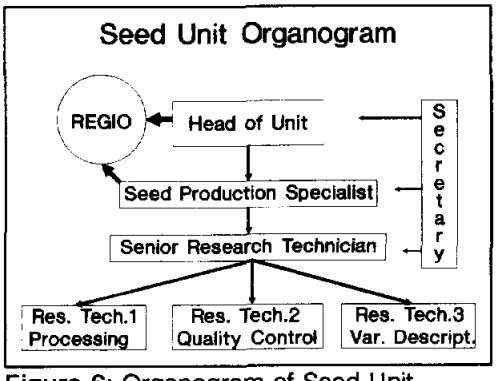

Figure 6: Organogram of Seed Unit

ANNEX I: Seed Unit's training courses in 1991

Name	Location	Date
A. Train the Trainer		
1. Wheat Field Inspection Methodology	Sids, Egypt Sakha	06/04 - 11/04
B. Regular/Regional Courses		
2. Seed Health Testing	ICARDA, Aleppo	17/03 - 28/03
3. Seed Certification	Amman, Jordan	28/04 - 07/05
4. Seed Processing	ICARDA, Aleppo	30/06 - 11/07
5. Seed Testing	Amman, Jordan	20/10 - 31/10
C. In-country Courses		
6. Legume Seed Production	Amman, Jordan	28/04 - 07/05
7. Seed Processing	Sakha, Egypt	09/11 - 24/11
D. Individual Trainees	**Countries**	
8. General Seed Production	Egypt, Syria, Ethiopia	03/04 - 18/06
9. Morphological Variety Description	Egypt, Jordan Syria	01/04 - 06/06
10. Seed Health Testing	Jordan	07/07 - 18/07
11. Laboratory Morphological Variety Description	Libya	31/03 - 04/04
12. Germination Testing	Syria	21/07 - 28/07
13. Seed Processing Medics	Morocco, Syria Libya	16/07 - 21/07