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FEED PRODUCTION PROJECT

Annual Report for 1988

**ANNUAL REPORT
1988**

Seed Production Project

A joint special project

of

The Government of The Netherlands

The Government of the Federal Republic of Germany

and

The International Center for Agricultural Research in the Dry
Areas.

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1. INTRODUCTION

To strengthen seed programs in West Asia and North Africa a special project "Development of National Seed Production Organizations in the ICARDA Region" is funded by the Governments of the Netherlands and the Federal Republic of Germany.

2. OBJECTIVES

The overall objective of the project is to strengthen the national seed production organizations in West Asia and North Africa.

This main objective is split into the following seven secondary objectives:

- a) To build up facilities at ICARDA for training in seed production.
- b) To train regional seed production staff through (1) in-country training courses, (2) courses at ICARDA, (3) individual training, and by (4) developing training manuals.
- c) To build up seed production infrastructure through (1) workshops, seminars; (2) round table discussions; (3) in-country projects; and (4) consultancies.
- d) To make available high quality seed of cereals, food legumes and medic for National Programs.
- e) To disseminate information.
- f) To train NARC's staff in morphological varietal description and to make available varietal descriptions of cereal and food legume varieties.
- g) To carry out regional seed technology research.

During the second phase of the project emphasis is slightly shifting from training of seed production staff towards strengthening of seed production infrastructure. More attention will be paid to (1) food legume and pasture and forage crops, (2) morphological varietal descriptions and (3) regional seed technology research.

3. FACILITIES FOR TRAINING IN SEED PRODUCTION AT ICARDA

During 1988 seed production facilities were installed for training of seed production staff from the region. Facilities are also used to assist other seed production activities at ICARDA and to assist commodity programs.

A seed testing laboratory and a seed production laboratory were equipped. A 1 tonne/hr seed processing plant was made operative. The plant consists of two units. Unit 1 is composed of a deawner, air-screen cleaner and indented cylinder, while unit 2 has a treater and a gravity separator. Project funds were used to purchase the equipment; the shed to accommodate the equipment was financed from the ICARDA core budget.

4. TRAINING OF REGIONAL SEED PRODUCTION STAFF

4.1. Courses

Training courses are essential to develop well trained staff to run the seed program.

The courses conducted in 1988 were one general seed technology courses and two specialized courses. The number of participants trained is indicated in Table 1 and 2. The number of regional seed production staff trained has clearly been increasing over the years. Moreover, the percentage of trainees coming from National Seed Production Organizations increased at the expense of trainees from National Agricultural Research Centers.

Curricula for other specialized courses have been developed and seed production staff from the region is trained in the project's seed production facilities. Seed production training manuals have been developed.

4.1.1. Seed Health Testing Course, Addis Ababa, Ethiopia, October 5-16

ICARDA's ninth seed course (jointly organized with the Seed Health Laboratory and the Ethiopian Seed Corporation) was sponsored by the Technical Center for Agricultural and Rural Development (CTA) and FAO.

The objective of the course was to train participants in the different aspects of seed health testing related to seed production programs. Attention focused on fungi, but viruses, bacteria, nematodes and insects were also discussed. Furthermore participants were instructed in quarantine, field inspection, seed treatment, and the control of storage pests and diseases. Some time was devoted to other seed quality control aspects (seed testing, seed certification, seed legislation).

The course was held in Addis Ababa at the Ethiopian Seed Corporation (ESC).

The number of participants was 25 i.e. 6 from ESC seed quality laboratory, 12 field inspectors, 1 from the Institute for Agricultural Research, 1 from the International Livestock Center for Africa, 1 from the Ministry of State Farms, 3 from the Plant Genetic Resources Center and 1 from the Ministry of Agriculture.

Table 1: Seed production personnel trained (by country) in ICARDA's courses (Individual trainees and participants of residential training courses and workshops are not included)

Country	Number trained		
	up to 1985	1985-1987	1988
Afghanistan	1	1	
Algeria	1	3	
Egypt	3	34	46
Ethiopia		6	25
India	1		
Iran	4	1	
Iraq		2	
Jordan	7	2	
Lebanon	1		
Lybia		1	
Morocco	5	2	
Saudi Arabia		2	
Somalia	2	1	
Sudan	2	8	
Syria	6	24	
Tunisia	2	3	
Yemen (North)		2	23
Yemen (South)	2	3	
Total	37	95	94

4.1.2. Seed Certification Course, Sakha, Egypt, April 24-27

The eighth seed course (jointly organized with GTZ and the Egyptian Central Administration for Seed) was sponsored by GTZ's Seed Improvement Project.

The training course was held in Sakha, Egypt. More than 50 participants attended the course (including a number of senior scientists from the National Program). Lectures and practicals covered varietal description, maintenance breeding, seed certification (breeder, basic and certified seed), seed-borne diseases and roguing.

Table 2: Seed production staff of different organizations trained in ICARDA's Seed Courses (Individual trainees and participants of residential training courses and workshops are not included)

Organization	Number trained		
	up to 1985	1985-1987	1988
NARC	19	21	22
IARC	2	3	1
NSPO	16	67	71
SC		4	
Total	37	95	94

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

4.1.3. General Seed Technology Course, Dhamar, Yemen Arab Republic, March 19-31

The seventh seed course was a general seed technology course organized jointly with the Seed Multiplication Project, Ministry of Agriculture and Fisheries, Yemen Arab Republic. The course was sponsored by the European Community (EC) financed Seed Multiplication Project.

The course was held at the Agricultural Research Authority, Dhamar. Twenty-three participants from YAR attended the course; 13 participants were working with the Seed Multiplication Organization while 5 participants from ARA and 5 participants from the Extension Service attended the course.

4.2. Residential Training Course

Participants of ICARDA's residential training courses were instructed in the different aspects of successful seed programs (lectures and practicals).

4.3. Course Participation

The Seed Production Specialist participated in the lecturing for the GOSM/FAO Seed Quality Control course, which was held in November 1988 in Syria. The facilities of the project (see Chapter 3) were used extensively.

Lectures were also given to the participants of the International Seed Production and Technology Course (16 May to 13 August in Wageningen, The Netherlands) on Constraints in Seed Programs and on Seed Quality Control Systems.

4.4. Development of Course Curricula

Curricula for the following courses have been developed: (1) Food Legume Seed Production, and (2) Morphological Varietal Description and Maintenance of Varieties.

4.5. Individual Trainees

4.5.1. At ICARDA

Facilities (see Chapter 3) are available at ICARDA to train staff of national seed programs in different aspects of seed production programs. The following trainees were trained:

- two-week training in cereal seed testing for Mr. Mohamed Hazza El Mamary, Seed Multiplication Project, Dhamar, YAR.
- two-month training in different seed production aspects for Mr. Ibrahim Al Khalidi, General Organization for Seed Multiplication, Aleppo, Syria.
- two-month training in different seed production aspects for Mr. Idrissi J. Abdelouhed, SOGETA, Morocco.

4.5.2. Outside ICARDA

- two-week training in seed processing in Sweden for Mr. Abdul Aziz Niane, Senior Research Technician in the project.

4.6. Manuals

The following training manuals were produced:

van Gastel, A.J.G. and Hopkins, J.D. (eds)-1988. Seed Production in and for Mediterranean Countries. Proceedings of the ICARDA/EC Workshop. Cairo, Egypt, 16-18 December 1986; 245 pages.

van Gastel, A.J.G. and Kerley, J. (eds)-1988. Quality Seed Production. Papers presented at the Seed Technology Course. Cairo, Egypt, 15-30 March 1986; 185 pages.
Ahmed S.S. (ed)-1988. Practical Seed Production (in Arabic), ICARDA, Aleppo, Syria; 195 pages.

The translation of one of the International Seed Testing Association's (ISTA) books "Testing for Genuineness of Cultivar" was sponsored.

Audiotutorials from the Seed Unit at CIAT "Essential Elements for Successful Seed Programs" and "Seed Development and Morphology" were translated into Arabic and are used for training purposes.

5. BUILDING UP INFRASTRUCTURE

Seed production infrastructure needs strengthening in the countries of the region. The project contributed to the build-up of infrastructure through (1) workshops, (2) round table discussions, (3) consultancies, (4) visits, (5) projects, and (6) seed surveys.

5.1. Workshops

Workshops are not only considered as an integral part of the training activities but are also an effective tool to strengthen the seed production infrastructure. In 1988 the following workshops were organized.

5.1.1. "Seed Health in Seed Production", Addis Ababa, Ethiopia, October 1988

The objective of the workshop was to discuss aspects of seed health in seed production. The workshop was attended by 19 participants from Ethiopia and Egypt. On the first day questions of seed health testing, seed treatment and standards for important seed-borne pathogens were addressed.

On the second day, the workshop was divided in three working groups: (1) Production of Healthy Seed, (2) Seed Treatment and Quarantine, and (3) Seed Health Testing. They worked out recommendations, which were discussed in a plenary session. The plenary session also made recommendations for "Cooperation among the Countries of the Region and ICARDA".

Financial support came from the Technical Center for Rural and Agricultural Development (CTA), and the Ethiopian Seed Corporation.

5.1.2. Seed Certification Workshop, Cairo, Egypt, April, 1988

The objectives of the workshop were: (1) to review seed certification systems and (2) to propose adequate certification methods for Egypt. More than forty Egyptian seed officers attended the workshop and recommendations for the Egyptian seed certification activities were prepared (for follow-up see Chapter 5.2.2).

The workshop was sponsored by the Ministry of Agriculture and Food Security (CAS) and GTZ.

5.1.3. "Seed Production in the Arabian Peninsula", Sana'a, YAR, March 1988

To discuss (1) future cooperation between the seed programs of the Arabian Peninsula and (2) the Yemen Arab Republic's Seed Program, a small seminar "Seed Production in the Arabian Peninsula" was organized in Sana'a, YAR. Seed production staff from the Yemen Arab Republic, Jordan, Lebanon, Egypt and Saudi Arabia participated as well as representatives from International Institutions (ICARDA, FAO, EC) and private seed companies (Misr-Pioneer, Egypt).

During the first two days countries presented their seed programs; International Organizations and seed companies their seed activities. The third day was devoted to discussions on (1) future cooperation among organizations involved in seed production and (2) the YAR's seed program. Comprehensive recommendations for future cooperation and for the YAR Seed Program were drawn up (for follow-up see Chapter 5.2.1).

The workshop was sponsored by the EC funded Seed Multiplication Project and the Ministry of Agriculture and Fisheries of the Yemen Arab Republic.

5.2. Round Table Discussions

Round table discussions are meetings with a few subject specialists, they usually emphasize on one aspect of the seed program. In 1988 two round table discussions were organized.

5.2.1. Round Table on the Yemen Arab Republic's Seed Program

To discuss the recommendations made for the Yemen Arab Republic's Seed Program during the workshop "Seed Production in the Arabian Peninsula" (see Chapter 5.1.3), a one day's round table discussion was organized (Dharmar, March 21, 1988). The workshop was attended by representatives from the Ministry of Agriculture and Fisheries, the Agricultural Research Authority and the Seed Multiplication Organization.

5.2.2. Round Table on Certification in Egypt

To implement the recommendations made during the Seed Certification Workshop (see Chapter 5.1.2) a one day round table was organized (Cairo, November 5, 1988) in which the first draft for rules for field inspection (wheat) were drafted. Breeders, pathologists, and seed technologists attended the meeting. Follow-up round table discussion will be organized in 1989 to finalize rules for field inspections.

5.3. In-country Seed Projects

Annually ICARDA provides a small grant to Lebanon for seed production purposes. The Seed Production Project has designed the project and is responsible for back stopping. The project emphasizes the initial stages of seed multiplication, since they produce the material for all seed for farmers. The project is aiming at (1) identification and release of superior varieties and (2) the production of high quality seed of selected varieties of bread wheat, durum wheat, barley, lentil and chick pea.

In 1986/87 the project only covered cereals and the durum wheat variety Belikh was identified and released by the Agricultural Research Institute. During the second year of project operation, highly promising varieties of cereals and food legumes were identified and about 40 tonnes of seeds were made available. The new varieties are to be tested further during 1988-1989 crop season and, at the same time, seed increase operations are going on. Farmers co-operatives are being developed to facilitate the production of certified seed.

5.4. 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 and the results can be used to improve the seed production programs. Two seed survey are being carried out.

5.4.1. Yemen Arab Republic Seed Survey

During the 1988 season a seed survey of quality of wheat seed used by the farmers has been initiated in the Yemen Arab Republic. Results are not available yet.

5.4.2. Egypt Wheat Seed Survey

A seed survey of the quality of wheat seed at the farmers' level was carried out in Egypt for wheat. In 1986/1987 300 samples were collected from four different sources i.e. farmers, village cooperatives (which sell the seed to the farmers), Agricultural Credit Bank Stores (from where the seed is distributed to the

village cooperatives), and from seed processing plants. Samples were analysed in ICARDA's seed testing laboratory and in the seed testing station of the Central Administration for Seed, Giza. Samples were analyzed for physical purity, germination, and varietal purity (phenol test). The Agricultural Research Center planted the samples and the experiment was jointly scored for varietal purity and seed-borne diseases.

Data were analysed in 1988 and they indicate that physical purity and germination are acceptable (Table 3A). Among the farmers' samples a large number was below the standard. This is not surprising since many farmers do not buy regularly certified seed but use own-saved seed.

Although the situation with regard to physical purity and germination is acceptable, the situation with regard to varietal purity as demonstrated in both the phenol test (Table 3B) and in the field (Table 3C) is more serious.

Table 3A: Relation between source (Seed Processing Plant-A; Agricultural Credit Bank-B; Village Cooperative Store-C; Farmer-D) and the physical purity and germination of wheat samples collected in Egypt during 1986/87.

Source	Number of samples	Physical purity		Germination	
		average %	below standards %	average %	below standards %
A	4	98.8	-	94	-
B	74	98.9	-	94	2.7
C	154	98.9	1.3	94	0.6
D	130	97.0	16.2	93	6.9
Total	362	98.2	6.4	94	3.4

Table 3B: Relation between source (Seed Processing Plant-A; Agricultural Credit Bank-B; Village Cooperative Store-C; Farmer-D) and off-types status as measured by the phenol test of wheat samples collected in Egypt during 1986/87.

	Total number of samples	Off-types (%)		Mixture or Not the variety (%)
		pure or almost pure	not sufficiently pure	
A	2	-	100.0	-
B	56	53.6	41.1	5.3
C	106	61.3	35.8	2.8
D	108	51.9	25.9	22.2
Total	272	55.5	33.5	11.0

Table 3C: Relation between source (Seed Processing Plant-A; Agricultural Credit Bank-B; Village Cooperative Store-C; Farmer-D) and purity in the field of wheat samples collected in Egypt during 1986/87.

	no of plots	Field purity (%)			
		pure or almost	not sufficiently pure	mixture	not the variety
A	4	-	50.0	25.0	25.0
B	69	26.1	63.8	5.8	4.3
C	143	18.9	73.4	2.8	4.9
D	47	27.7	40.4	19.1	12.8
Total	263	22.1	64.6	6.8	6.5

The phenol test indicated that only 55% of the samples could be considered pure; the remaining were either not sufficiently pure, a mixture or not the variety. The results obtained in the field show similar trends.

It can be concluded that the level of the seed quality is relatively low and that there is considerable scope for improvement. The majority of the impurities is probably due to insufficient cleanliness in seed production fields and seed processing plants. Field inspections are not up to standard and fields are accepted with large numbers of off-types.

The seed supplied for multiplication by the breeders is often not sufficiently pure and in such cases it is impossible for the seed organization to produce pure certified seed.

The first step for improvement is, therefore, the maintenance breeding. This coupled with cleanliness (in fields, processing plants, seed testing station and stores), proper field inspection and roguing could considerably increase the quality of the seed.

In the 1987/88 season only Agricultural Credit Bank stores were sampled and analysed for varietal purity in the laboratory and in the field. Results are not yet fully available, but a similar trend is emerging.

The project jointly with other groups involved in improving the seed industry has initiated round table discussions (see Chapter 5.2.2.) and training in field inspection (see Chapter 5.1.2. and 4.1.2.).

6. SEED MULTIPLICATION ACTIVITIES

6.1. Maintenance of Varieties

Any sound multiplication program distributes seed which derives from breeder seed through one or more multiplication

generations. This generation system is the basis for the production of pure and disease free certified seed; breeder seed is multiplied to pre-basic seed, which is in turn multiplied to basic seed (the basis for all certified seed). ICARDA was often sending the production of verification trials to the countries of the region.

The project initiated the generation system for wheat and barley. In 1987 500 ears of all promising cereal lines were collected for the production in 1988 of pure and disease free breeder seed. Amounts of breeder seed harvested in 1988 are indicated in Table 4; only breeder seed of wheat and barley was produced. Breeder seed was sown in 1988 to produce pre-basic seed, which in turn will produce the basic seed. Basic seed is the generation which will be distributed to the countries of the region.

Similarly in 1988 single plants of chickpea and lentil varieties were collected to start the multiplication cycle.

Up to now we have reached the pre-basic seed production stage and thus no basic seed is available from this program for distribution to the region. Therefore, the project introduced a special class of seed: "Quality Seed". Quality seed is seed produced according to official multiplication practices, but it does not directly derive (through one or more generations) from breeder seed.

Table 4: Amount of seed harvested per multiplication category during the 1988 harvest.

	Breeder Seed		Pre-basic Seed	Basic Seed	Quality Seed	
	No of vars	Production (in kgs)			No of vars	Production (in kgs)
Bread wheat	6	380			8	15740
Durum wheat	6	390			8	19680
Barley	13	770	These stages have not yet been reached		19	31720
Chickpea					2	7760
Lentil					2	1100
Medic					4	2970

6.2. Production of Quality Seed

The project is multiplying seed of varieties which have shown to be promising in one or more countries of the ICARDA region. The multiplication is meant to give such varieties an early start in the countries of the ICARDA region; in case such varieties are released, some seed is available. At the same time the national program should start building up its certified seed supply. Furthermore, this quality seed is often used for research purposes (verification experiments etc.) and sometimes sent to countries in case of crop failure.

The project is not aiming at competition with any national seed production organization; seed production is a national responsibility and the project only tries to stimulate seed production in the countries of the ICARDA region. The production of seed should be seen in that light.

In 1988 a total of 35.4 tonnes of wheat (Table 5A) was produced which was distributed as follows: (1) 16.2% to the countries of the region, (2) 2.7% used for next year's plantings of the project, (3) 1.7% to the Syrian Seed Organization (rather low because no new varieties were released), (4) 16.8% for research purposes (on-farm verification etc.), (5) 4.2% for plantings of Station Operations at the ICARDA farm, (6) 23.7% for farmers (which are expected to be seed growers), (7) 7.6% for other purposes, and (8) 27.0% is still in the store (mainly of non-released varieties).

For barley (Table 5B) a total of 31.7 tonnes was produced which was distributed as follows: (1) 52.1% to the countries of the region, (2) 1.7% used for next year's plantings of the project, (3) no seed to the Syrian Seed Organization (because no new varieties are available), (4) 14.0% for research purposes (on-farm verification etc.), (5) 6.0% for plantings of Station Operations at the ICARDA farm, (6) 26.2% is still in the store (mainly of non-released varieties).

Table 5C and 5D present information with regard to chickpea and lentil. Only limited amounts were produced: 7.8 tonne of chickpea (two varieties) and 1.1 tonne of lentil (two varieties). Almost all the seed was distributed. Chickpea seed was distributed as follows: 16.9% for countries in the region, 7.7% for seed project, 48.4% for research purposes, 0.4% for Station Operations and 19.3% for the Syrian seed multiplication organization.

The majority of the lentil seed was handed over to the Syrian Seed Organization (45.5%) and used for planting of seed production fields (15.5%).

Table 5A: Wheat seed produced and distributed by the Seed Production Unit

Variety	Quantity of seed produced (estimated) (kg)	Distribution						Clean seed still available (kg)	
		Region	Seed Unit	GOSM	Research purposes	ICARDA farm	Progressive farmers		Others
Sham 3	8 350	750	100	200	1 020	800	5 300	180	
Sham 4	5 365	450	100	200	1 165	500	2 200	50	
Belikh 2	3 165	220			45			2 900	
Seri 82	5 000	3 000	100		400			400	
Sham 1	2 795	50	100	200	865	200	900	80	
Lahn	1 895		120		1 450			100	
Sebou	1 800	400						1 400	
NKT's	1 375	250	50		75			1 000	
Nesser	1 375		150		200			925	
Zargoun	1 200	200						1 000	
Sunberd's	825				15			610	
Omrabi 9	900	400	50		300			150	
Omrabi 17	400				200			100	
Sham 2	350		50					300	
Bouhouth 4	250		50					200	
Daki	370	20	100		200			50	
Total	35 415	5 740	970	600	5 935	1 500	8 400	2 700	9 570
%	100	16.2	2.7	1.7	16.8	4.2	23.7	7.6	27.0

Table 5B: Barley seed produced and distributed by the Seed Production Unit

Variety	Quantity of seed produced (kg)	Distribution				Clean seed still available (kg)
		Region Unit	Seed	Research purposes	ICARDA farm	
Rihane 03	13 660	11 000	300	660	800	900
Faiz	4 700	3 280			800	620
Harmal	2 400	1 600	50	450	100	200
Mathnan	1 250	200	50		200	800
WI 2269	1 230	180				400
WI 2291	850			650		100
WI 2198/Emir	1 000			750		600
WI 2198	900			400		900
Rihane 05	800					800
Emir/APM	700					700
Sarras	600			100		500
Roho/Mazurka	600	100		100		400
Arta	625	70	25	480		50
Alger ceris	600					600
Salmas	500	100				400
Tadmor	455		25	330		100
SLB 39/50	400		25	300		75
Arabic Aswad	300		25	230		45
SLB 39/10	150		25			125
Total	31 720	16 530	525	4 450	1 900	8 315
%	100	52.1	1.7	14.0	6.0	26.2

Table 5C: Chickpea seed produced and distributed by Seed Production Unit

Variety	Quantity seed produced (estimated) (kg)	Distribution				Clean seed (kg)
		Region	Seed Unit	Research purposes	ICARDA farm	
Ghab 1	6 600	750	400	3 400	30	1 500
Ghab 2	1 160	560	200	360		40
Total	7 760	1 310	600	3 760	30	1 500
%		16.9	7.7	48.4	0.4	19.3

Table 5D: Lentil seed produced and distributed by Seed Production Unit

Variety	Quantity of seed produced (estimated) (kg)	Distribution			Clean seed still available (kg)
		Seed Unit	Research purposes	GOSM	
Idleb 1	900	100	15	500	285
ILL 16	200	70	100		30
Total	1 100	170	115	500	315
%	100	15.5	10.5	45.5	28.6

6.3. Processing

The production of all seed multiplication fields was cleaned by the new seed processing machines (see Chapter 3), as well as several seed lots of commodity programs. Crops cleaned and/or treated were: barley, wheat, chickpea, lentil, medic, Vicia sativa, Vicia narbonensis, Vicia faba, Lathyrus and oats. Information on the amount of seed cleaned for the different programs and units is given in Table 6. The new seed processing line (which was mainly purchased for training purposes) has also considerably assisted the commodity programs and units to clean the seed for their 1988/89 plantings.

Worth mentioning is:

- the amount of raw medic seed (15.2t) which has been cleaned; it contributed significantly to the availability of medic seed.
- the different vetch species and Lathyrus cleaned for the Pasture Forage and Livestock Program.
- the cleaning and grading of faba bean (0.3t) for the Faba Bean Group
- the separation of vetch from oats for Station Operations.

The majority of the seed cleaned for the seed production unit and for the Farm Resource Management Program has been treated with appropriate fungicides.

7. INFORMATION EXCHANGE

Jointly with the Seed Health Laboratory a zero copy, for internal review, of a seed newsletter "SEED INFO" has been produced. No decision with regard to distribution has been taken.

Furthermore, the workshops organized and the manuals published by the project all play a role with regard to the exchange of information on seed production topics.

8. VARIETAL DESCRIPTIONS

Morphological varietal descriptions are often not made by the breeders. The project initiated distinctness, uniformity and stability experiments, aiming at producing morphological descriptions of ICARDA-related wheat and barley varieties. As much as possible, varieties grown by the National Programs are included in these experiments. A total of 20 barley and 20 wheat varieties were included in this experiment. Observations are made throughout the growing season and mature ears and seeds are described in the seed production laboratory. Results of experimentation will be available early 1989. An example of a wheat varietal description is given in List 1. The project is now able to conduct training in morphological varietal description for NARC staff of the region.

9. RESEARCH

Seed surveys of the quality of wheat seed at the farmers' level were undertaken in Egypt and the Yemen Arab Republic. Such surveys are a tool to improve the seed production programs. Results of the Egypt wheat Seed Survey are presented in Chapter 5.5.2. Results of the Yemen survey are not yet available.

Furthermore, a seed rate experiment was carried out to assess, for wheat and barley, the seed rate which, under Aleppo conditions, results in the fastest multiplication ratio. As can be seen from Table 7 the lowest seed rate (kg/hectare) resulted in the highest multiplication ratio (kgs of yield per kg of seed sown), although the yield was reduced. A seed rate of 50 kg/ha is recommended for wheat and barley if a fast multiplication of a variety is needed.

List 1: Morphological Variety Description of Sham 1

Name of Variety: Sham 1
Crop : Durum Wheat

Observed in 1986/1987/1988/1989

PLANT

-anthocyanin coloration coleoptile: strong
-growth habit : intermediate to semi erect
-anthocyanin coloration of
auricles of flag leaf : very weak
-time of ear emergence : early
-glaucosity of sheath of flag leaf: weak to medium
-glaucosity of leaf blade of flag
leaf : weak to medium
-plant height : medium
-cross section straw : thin to medium
-glaucosity of neck : strong
-hairiness of uppermost node : medium

EAR

-anthocyanin coloration of anthers: present
-glaucosity : medium
-color : colored
-shape : tapering
-density : dense
-distribution awns : whole length
-length of awns at tip of ear : long

LOWER GLUME

-shoulder width : narrow
-shoulder shape : rounded
-beak length : short
-beak shape : straight to slightly curved
-internal imprint : large

GRAIN

-color : red
-shape : elongated
-brush hair : medium
-coloration with phenol : 1.5-2

Table 6: Raw seed processed in the seed processing plant of the Seed Production Unit in 1988.

	Wheat	Barley	Chickpea	Lentil	Medic	Vetch	Vicia faba	Oats	Lathyrus	Total
Seed Unit	38.7	35.7	8.0	0.8						83.2
CIP										
PFLP	3.2			1.6	15.2*	2.5			1.0	23.5
FLIP				3.1			0.3			3.4
FRMP	9.2	4.4	2.0	2.4						18.0
Station Op	5.0	3.1		6.1		7.5		1.4	0.9	24.0
Others			1.0							1.0
Total	56.1	43.2	11.0	14.0	15.2	10.0	0.3	1.4	1.9	153.1

* 15.2 tonnes of medic seed yielded approximately 6 tonnes of clean seed.

Table 7: Effect of seed rate on yield and multiplication ratio

WHEAT

Seed rate (kg/ha)	Yield (kg/ha)	Multiplication ratio
25	4081	163
50	4907	98
75	5176	69
100	4949	49
125	5574	44

BARLEY

Seed rate (kg/ha)	Yield (kg/ha)	Multiplication ratio
25	3933	157
50	5161	103
75	5122	68
100	5717	57
125	5798	46

10. CONFERENCES ATTENDED

- 10.1. Technology Development and Changing Seed Supply System: Tilburg, the Netherlands, June 22-23, 1988.

The Development Research Institute (IVO) in Tilburg, the Netherlands organized an international seminar to discuss conclusions and recommendations of (1) an collaborative research project "The International Dimension of Seed Industry Development" and (2) case studies of the India, Thailand and month Seed Industry. These three countries were chosen because of their differences in the degree of openness and the size of the seed market.

Two papers of ICARDA's Seed Production Specialist were used as background papers i.e. (1) Stimulating and Development of National Seed Production Organizations in West Asia and North Africa: ICARDA and Seed Program Development and (2) Seed Programs in the African, Caribbean and Pacific (ACP) Countries.

11. PUBLICATIONS

11.1. In Training Manuals

- van der Burg, W.J. and van Gastel, A.J.G. 1988. Useful Literature for Seed Technologists (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1986. Seed Marketing (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1986. Seed Program Components (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1986. Variety Testing (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1988. Seed Certification. In Quality Seed Production (van Gastel, A.J.G. and Kerley, J., eds), ICARDA, Aleppo, Syria. Also translated into Arabic and published in Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1988. Seed Production of Cereals. In Quality Seed Production (van Gastel A.J.G. and Kerley, J., eds), ICARDA, Aleppo, Syria. Also translated into Arabic and published in Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1988. Varietal Identification (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1988. Seed Processing (in Arabic). In Seed Production Technology (Ahmed, S.S. ed), 1988, ICARDA, Aleppo, Syria.

11.2. In Conferences

- van Gastel, A.J.G. 1988. Statement on ICARDA's Seed Activities. In Seed Production in and for Mediterranean Countries (van Gastel, A.J.G. and Hopkins, J.D., eds), ICARDA, Aleppo, Syria.

- van Gastel, A.J.G. 1988. ICARDA and Seed Program Development. Paper presented during ICARDA/EC Seminar "Seed Production in the Arabian Peninsula", 16-18 March, 1988, Sana'a, Yemen Arab Republic.
- van Gastel, A.J.G. 1988. Food Legume Seed Programs. Presentation for "West Asia Food Legume Travelling Seminar", May 1988, ICARDA, Aleppo, Syria.
- van Gastel, A.J.G. 1988. Stimulating and Development of National Seed Production Organizations in West Asia and North Africa: ICARDA and Seed Program Development. Paper prepared for seminar. "Technology Development and Changing Seed Supply System", 22-23 June, 1988, Tilburg, The Netherlands.

12. PERSONNEL AND CONSULTANTS

12.1. Seed Project Personnel

Dr. A.J.G. van Gastel	Senior seed production specialist, 12 months
Mrs. Maha Kabbani	Secretary, 12 months
Mr. Abdul Aziz Niane	Senior research technician, 12 months
Mr. Gazi Jabri	Research technician, 12 months
Mr. Saed Hayani	Research technician, 5 months

12.2. Consultants

Dr. Aref Abdul Baki	Advisor National Scientific Council, Lebanon, (March '88)
Dr. Claude Anselme	Director INRA Seed Testing Station, France (October '88)