CEREAL IMPROVEMENT PROGRAM

RESEARCH AND TRAINING PLANS

1986/87 SEASON

International Center for Agricultural Research in the Dry Areas

(ICARDA)

Box 5466. Aleppo. Syria

CEREAL IMPROVEMENT PROGRAM

RESEARCH AND TRAINING PLANS

1986/1987

International Center for Agricultural Research

in the Dry Areas.

ICARDA

November 1986.

Introduction

These research and training plans for 1986-87 cropping season were prepared after intensive discussions during the cereal program planning meeting held in Aleppo on September 16-18, 1986. Each staff member reviewed his research results of the 1985-86 season with particular emphasis on those findings which influenced the planning of the 1986-87 experiments. Activities that were proposed to be discontinued as well as new ones to be initiated were thoroughly discussed. These planning sessions were attended by ICARDA scientists, directing staff, support staff, and a number of scientists from national programs. This permitted excellent interactions between ICARDA and national program scientists. The projects were critically reviewed by scientists within the program, between programs and their relevance to the national programs were assessed. During these sessions collaborative projects with national programs, conferences, workshops, international nurseries as well as the training activities proposed by the program for 1986-87 season were examined.

This document has been prepared after considering the comments received from ICARDA and national program scientists, from Dr. R. Petersen, Consultant biometrician, and keeping in view program priorities and resources. The work plans for collaborative projects with individual national programs have been developed separately and are available on request. They include collaborative work with Algeria, Cyprus, Egypt, Jordan, Lebanon, Morocco, Pakistan, Sudan, Syria, Tunisia and Turkey and a number of institutions in the developed countries.

The research plans for 1986-87 are presented according to the following order: Barley Improvement, Durum wheat Improvement, Bread wheat Improvement, High Elevation Cereal Improvement, International Cooperation, and Training.

Under each heading the field experiments have been grouped according to major activities (breeding, agronomy, pathology, etc.). Within each major activity, different field trials have been grouped according to common objectives, or material, or methodologies. Each trial (or group of trials) is identified by a title followed by the main objective(s) and by the number and/or name of locations. Further details such as plot size, experimental design, number and type of treatments, ANOVA, type of observations to be recorded, scientists involved, and file names where the data will be stored, are provided when applicable or appropriate.

The present list does not include all the research activities carried out in cooperation with other Institutions: these will be included when full details will be available. These research plans have been prepared before the 1986-87 planting and therefore some modification in plot size, and number of replications are possible.

I hope this list of experiments will be of use to ICARDA scientists, administrators as well as to the scientists visiting the program.

J.P. Srivastava

Leader
Cereal Improvement Program

November 10, 1986

CEREAL IMPROVEMENT PROGRAM

RESEARCH AND TRAINING PLANS FOR 1986-87

CONTENTS

CEREAL IMPROVEMENT PROGRAM

PROJECT I: BARLEY IMPROVEMENT

LIST OF EXPERIMENTS FOR 1986/87

The list of barley experiments for 1986/87 is presented according to the following order:

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 1. Evaluation and Utilization of Parents

Title	Observation nurseries
Objective	1) Evaluation and identification of potential parents suitable for crosses targeted for dry areas, moderate rainfall areas, and high elevation areas; 2) Supply the national cooperating Institutions with homozygous, stable germplasm promising for yield, agronomic characteristics and disease resistance.
Location	Tel Hadya, Breda, Bouider and 50 locations in the Region.
Design	Modified augmented design
Plot size	2 rows, 2.5 m long
Treatment	270 barley lines in three types of nurseries: BOL :Barley Observation nursery for Dry Areas; BOC : " " " " Cold tolerance; BOM : Barley Observation Nursery for Moderate rainfall Areas.
Observations	Growth habit and type — 1000 kernel weight Days to heading — Disease score Plant height — Plant score Days to maturity — Head score % Protein — % Lysine Kernel size and uniformity — Agronomic score Stability of Performance
Principal scientist	S. Ceccarelli
Scientists involved	S. K. Yau, E. Acevedo, V. Shevtsov
File name(s)	BOC8, BOL8, BOM86.

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 1. Evaluation and Utilization of Parents

Title	Regional Crossing Blocks and Aleppo Crossing Block
Objective	To design appropriate genetic combinations in relation to disease and lodging resistance, drought resistance and other yield limiting factors in the barley growing areas of the Region
Location	45 locations in the Region.
Design	Unreplicated
Plot size	2 rows, 2.5 m long
Treatment	144 barley lines in 45 locations; 400 barley lines at Tel Hadya in three planting dates.
Observations	Growth habit and type Days to heading Disease score Plant height Plant score Head score Days to maturity 1000 kernel weight Kernel size and uniformity % Protein % Lysine Stability of Performance Agronomic score
Principal scientist	S. Ceccarelli
Scientists involved	V. Shevtsov, S.K. Yau
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 2. Evaluation of Segregating populations

Title	Multilocation selection of segregating populations (pedigree)
Objective	Selection among and within families and comparison of segregating populations targeted for different areas.
Location	2500 F2's at Tel Hadya and Bouider and 270 F2's each of three groups (dry areas moderate rainfall areas and high elevation area). F3-F4 4500 populations grown only at Tel Hadya
Design	Unreplicated with systematic checks
Plot size	6 rows, 5 m long (4 rows 5 m long for F5-F4) spaced planted.
Treatment	10500 F2-F4 segregating populations.
Observations	Seedling vigor Tillering Earliness Plant height Disease resistance Agronomic characteristics
Principal scientist	S. Ceccarelli,
Scientists involved	V. Shevtsov
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 3. On-site Testing

Title	Multilocation initial yield trials
Objective:	Test yield potential and yield under dry conditions of lines derived from the pedigree method, bulks handled with the bulk-pedigree, and of lines selected from landraces
Locations:	Bouider, Breda, Tel Hadya.
Design:	Modified augmented design (6x6)
Plot size:	10 rows, 2.5 m long
Treatments:	6 trials with 276 test plots, 36 control plots and 12 sub control plots each. (324 plots x 6 trials x 3 locations = 5832 plots).
Observations:	Seedling vigor Tillering Earliness Plant height Disease resistance Agronomic characteristics
Principal scientist	S. Ceccarelli,
Scientists involved	V. Shevtsov
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Multilocation preliminary yield testing
Objective	Test the yielding ability, adaptation and disease resistance of lines and bulk families selected from the initial yield trials in 1985/86
Location	Bouider, Breda and Tel Hadya
Design	Triple lattice (5x5) at Bouider Simple lattice (5x5), at Breda and Tel Hadya
Plot size	6 rows, 2.5 m long .
Treatment	20 lines and 5 checks (26 trials x 7 replications = 4550 plots).

ANOVA

Source of var.	d.f. (1)
Entries	24 (24) + combined analysis
Replications	1 (2)
Blocks	8 (12)
Error	16 (36)
Total	43 (74)

(1) Bouider.

Observations

Growth vigour	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size DSI
Grain uniformity	% protein
% Lysine	Diastatic pover

Principal scientist	S. Ceccarelli,
Scientists involved	V. Shevtsov
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Multilocation advanced yield testing
Objective	Test the yielding ability, disease resistance and adaptation of 230 lines selected from preliminary yield trials in 85/86, 88 lines from landraces, 75 Fs bulk families, and 2Fs *H. vulgare* and *H. spontaneum*
Location	Tel Hadya (two planting dates), Breda, Bouider (in Syria); Terbol (in Lebanon); Laxia (in Cyprus), Ousseltia (in Tunisia), and Morocco
Design	Triple lattice (5x5) in Bouider simple lattice (5x5) in all other locations.
Plot size	10 rows, 5 m long .
Treatment	20 lines and 5 checks (20 trials).

ANOVA

Source of var.	d.f.
Entries	24 (24)
Replications	1 (2) + combined analysis
Blocks	8 (12)
Error	16 (36)
Total	19 (74)

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Peduncle length	Grain yield
Disease score	DSI
1000 kernel weight	Grain size
Grain uniformity	% Protein
% Lysine	Diastatic power

Principal scientist	S. Ceccarelli
Scientists involved	V. Shevstov
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 4. International Testing

Title	Regional Barley Yield Trials
Objective	To test the yielding ability, the adaptation and disease resistance of the most promising genotypes selected among the most widely selected lines in the regionally distributed barley observation nurseries.
Location	80 Locations in the Region includind Bouider, Breda and three planting dates at Tel Hadya.
Design	Randomized Block Design (4 Replications)
Plot size	6 rows, 2.5 m long
Treatment	23 barley genotypes, and 1 National check in each of : RBYT C RBYT L RBYT M
Observations	Growth type Days to heading Plant height Plant type Days to maturity Diseases reaction Seed characteristics Yield and yield stability
Principal scientist	S. Ceccarelli
Scientists involved	S.K. Yau, V. Shevtsov
File name(s)	BRC86D, BRL86D, BRM86D

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

a) Introductions

Title	Evaluation of newly introduced germplasm
Objective	Identification of potential parents
Location	Tel Hadya
Design	Unreplicated
Plot size	2 rows, 2.5 m long
Treatment	IBON (106 genotypes), BYDV (115 genotypes) CB Cebada (28 genotypes), F2 S x S (183 populations), F2 S x W (85 populations), F2 ZA (107 populations) from CIMMYT MEXICO F2 (170) and F3(82) from CYPRUS 25 land races from CYPRUS 36 HL from GERMANY 4 from FRANCE
Principal scientist	S. Ceccarelli
Scientist involved	GRU Scientist

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

b) Evaluation of local cultivars

Title	Preliminary evaluation of lines extracted from local cultivars
Objective	Identify promising lines for further evaluation
Location	Bouider and Tel Hadya
Design	Modified augmented design
Plot size	2 rows, 2.5 m long
Treatment	600 single head progenies divided in 5 trials (12x12 modified augmented design). Each trial includes 120 lines, and 24 control plots.
Observations	Growth habit and type Head size Plant height Disease score 1000 kernel weight Days to heading Days to maturity No. of heads/m2(score) Grain yield DSI
Principal scientist	S. Ceccarelli
Scientists involved	
File name(s)	LR8701 to LR8705

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

Title	Selection for low and high wilting
Objective	To evaluate the efficiency if wilting as selection criterion to improve grain yield in stress conditions
Location:	Bouider, Breda, Tel Hadya
Design :	Triple lattice (6x6)
Plot size	10 rows, 5m long
Treatments	14 Bulk families selected for low wilting, 14 bulk families selected for high wilting, 8 checks
ANOVA	Source of var. d.f.
Observations	
Principal scientist	S. Ceccarelli
Scientist involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

Title	Evaluation of pure lines vs. mixture
Objective	To test yield stability of pure lines selected from landraces and three mixtures of different no of lines.
Location	Bouider, Breda, T. Hadya, Catania, Hassake
Design	Triple lattice
Plot size	6 rows x 2.5 m
Treatments	16 pure lines, 3 mixtures (with 16, 8 and 4 lines), 3 checks
Principal scientist	S. Ceccarelli
Scientist involved	N. Boggini (Italy)
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

c) Evaluation of H. spontaneum

Title	Evaluation of selected accessions of H. spontaneum.
Objective	Further evaluation of H. spontaneum accessions selected for plant type and their utilization in crosses with two-row improved cultivars and land races.
Material	37 accessions of H. spontaneum.
Location	Bouider
Design	Simple lattice design 7x7 (two replications)
Plot size	2 rows, 2.5 m long

ANOVA

Source of var.	d.f.
Entries	48
Replications	1
Blocks (adj)	12
Error	36

Observations

Early growth vigour
Cold tolerance
Days to heading
Plant height
Disease reaction
Leaf senescence
Head size
1000 KW

Principal scientist	S. Ceccarelli
Scientist involved	GRU Scientist
File name(s)	SPON187

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

Title	Evaluation of F_5 families *H. spontaneum* x *H. vulgare*.
Objective	To evaluate yield under dry conditions.
Location	Bouider
Design	RBD with two replications.
Plot size	2 row, 2.5 m
Treatment	24 selected F_4 families *H. spontaneum* x *H vulgare* and 4 checks (A. Abiad, A. Aswad, WI2291, Tadmor).
Observations	Early growth vigour Cold tolerance Plant height No. of heads/m_2 Days to heading Head size Leaf senescence 1000 kernel weight Grain yield
Principal Scientist	S. Ceccarelli
Scientist involved	GRU Scientist
File name	WILD87

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Breeding: 5. Special Projects

Title	Male sterile facilitated Recurrent Selection
Objective	Assemble minor genes for disease resistance
Locations	Tel Hadya
Design	Unreplicated with systematic control
Plot size	10 x 10 (space planted)
Treatment	9 sterile populations (for scald, net blotch leaf rust), 3 winter type sterile populations 6 fertile populations for different diseases (as above).
Observations	Selection of fertile plants to be tested in 86/87 as F2 populations.
Principal scientist	S. Ceccarelli
Scientists involved	J. van Leur, M. Mushref
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Physiology

Title: Screening barley genotypes for coleoptile length.

Objective: To detect differences in coleoptile length of the matertial used in the crop physiology and agronomy trials of the barley improvement projects.

Location: Tel Hadya.

Design: Completely randomized bloock, 4 replication.

Plot size: 18 seeds of each genotype will be seeded in rows, at 3cm depth, in trays containing humid sand located in a dark germination chamber. The coleoptile length will be recorded to the nearest milimeter when the coleoptiles of the seedlings have been ruptured by their first leaves.

ANOVA

Source of var.	d.f.
Varieties	70
Reps	3
Error	210
Total	283

Principal scientists: E. Acevedo

Scientists involved: I. Naji, S. Ceccarelli.

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Physiology

Title Genotype characterization

Objective Evaluate a theoretically derived hypothesis of crop attributes in terms of their importance in determining suitability for water stress in mediterranean environments. Identify constitutive and adaptive characters.

Location Tel Hadya, Breda, Bouider, PBI (Cambridge).

Design Randomized Complete Block, 4 replicates .

Plot size 2.4m x 5m (12 rows x 5m long)

Treatment 71 barley genotypes representing contrasting characters in early vigour, growth at low temperatures, height under stress, flowering date, grain filling period. They will also represent: varieties with high yield potential, varieties with good yield stability, pure lines isolated from landraces, the best varieties from countries served by ICARDA, lines thought to be stress tolerant , promising lines from CIMMYT's program in Mexico.

ANOVA

Source of var.	d.f.
Varieties	70
Replications	3
Error(a)	210
Total	283

Observations

Crop establishment
Crop and plant growth and development
Dry matter, green area, ground cover through the season.
Plant traits: tiller number; leaf number, colour, posture, length, width, thickness, rolling; waxiness, pubescence; tissue water relations; stomatal conductance and CO_2 fixation; water extraction;
plant height; internode length.
Yield and yield components.

Principal scientist E. Acevedo

Scientists involved S. Ceccarelli, I. Naji

File name(s)

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Agronomy

Title

Row spacing, sowing date and depth of barley genotypes differing in coleoptile length.

Objective

To study the effect of four major agronomic variables on initial canopy development, dry matter accumulation and ground cover.

Location

Tel Hadya, Breda and Bouider

Design

34 Factorial with single replication (blocks of 9 units with 3 factor interactions confounded) 81 plots.

Plot size

1.2 m width x 3.5 m long

Treatment

Three barley genotypes of similar phenological development and varying in coleoptile length, sowed at 3 depths, 3, 7 and 10 cm on three seeding dates 15 October (prior to the first rain), 15 November, 15 December, and three row spacing 10, 20 and 40 cm.

ANOVA

Source of var.	d.f.
Blocks	8
Main effects	8
2 Factor interaction	24
Error	40
Total	80

Observations

Seedling emergence and emergence rate.
Coleoptile length & subcrown internode length.
Plant number and tillers per square meter.
Ground cover at 7-10 day intervals.
Crop growth and development (Zadocks scale).
Dry matter at anthesis.
Ear number/m_2.
Yield and yield components.

Principal scientist

E. Acevedo

Scientists involved

I. Naji, S. Ceccarelli

File name(s)

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Physiology/Agronomy

Title: Influence of soil tillage and planting date on the growth of barley.

Object:
a) To implement a soil tillage operation for dry, early planting.
b) To compare at a relatively large scale the practices of dry, early planting versus planting after enough rain has accumulated to wet the soil profile to a minimum of 10 cm.

Location: Tel Hadya

Treatment: Tillage at 3 levels and planting date at 2 levels will be combined . The tillage levels will be the the following:

a) Farmer's practice (duckfoot-broadcast-duckfoot).
b) Minimum tillage (single pass planter).
c) Standard tillage (chissel followed by power harrow).

The planting date levels will be:
a) Dry planting (middle Oct.)
b) "Wet" planting (middle Dec.)

The dry planting is intended to be an early planting operation, while the 'wet' planting a late one. For experimental purposes and in order to avoid confounding between tillage and planting date, one treatment will be preirrigated to 10 cm soil depth in early October and a dry planting will be made in December by keeping the soil covered with a polyethylene film, and in turn covered with a layer of soil.

The planting depth will be at a minimum of 7 cm. A medium coleoptile varriety will be used for this purpose. (Rihane 03, coleoptile length = 4.27 cm).

Design: A factorial design (3 x 2 x 2) will be used. The field arrangement will be in a randomized complete block with 4 replications. The plot size will be 6 m x 30 m such that a minimum of two working widths of machinery will be allowed over one plot.

Observations
- Number of emerged plants/m2
- Ground cover (10 day intervals)
- Zadoks score (10 day intervals)
- Biological yield
- Grain yield

ANOVA

Source of variation	d.f
Blocks	3
A=tillage	2
B=Soil water content	1
C=Sowing date	1
AB	2
AC	2
BC	1
ABC	2
Error	33
Total	47

Scientists in charge E. Acevedo, J. Diekmann, H. Harris

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Pathology

Title	Screening for resistance to yellow rust, scald, powdery mildew, net blotch, leaf rust, barley leaf stripe and covered smut.
Objective	1. Identification of new sources of resistance 2. Development of screening techniques (net blotch)
Location	yellow rust: Tel Hadya and Terbol scald: Tel Hadya, Lattakia, El Ghab and Hassake powdery mildew: Tel Hadya, Lattakia net blotch: Tel Hadya, El Ghab leaf rust: Lattakia and Jordan covered smut: Tel Hadya (isolation area) barley leaf stripe: Tel Hadya (seedling test)
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long or short rows (25 cm long)
Treatment	2000 lines from ICARDA (Barley project and germplasm unit).
Observations	Agronomic score Disease score
Principal scientist	J. van Leur
Scientists involved	O.F. Mamluk
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Pathology

Title	Multilocation testing for multiple disease resistance.
Objective	1. Identification of new sources of multiple disease resistance 2. Elimination of susceptible materials
Location	18 "hot spot" locations within and outside the Region.
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long
Treatment	Preliminary Disease Nursery: 550 lines Key Location " " : 300 " Scald Nursery : 100 "
Observations	Agronomic score Disease score
Principal scientist	J. van Leur
Scientists involved	O.F. Mamluk, and National Program Scientists,

File name(s)

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Pathology:

Title	Screening for barley yellow dwarf virus (BYDV) resistance
Objective	Identification of barley genotypes which are resistant or tolerant to BYDV infection.
Location	Tel Hadya
Design	Three replications, two in the open field and one in the plastic house.
Plot size	Short rows (35 cm long)
Treatment	322 entries, 22 of which are repeated testing from the previous year.
Observations	Disease rating and agronomic evaluation (biological yield, grain yield, harvest index ... etc).
Principal scientist	K.M. Makkouk (GRP)
Scientists involved	J. van Leur and O.F. Mamluk

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Entomology:

Title	Screening for resistance to wheat stem sawfly
Objective	To identify sources of resistance to wheat stem sawfly
Location	Tel Hadya (artificial infestations) Suran (Natural infestation)
Design	RCB
Plot size	1 rows, 1m long, 2 reps
Treatment	For wheat stem sawfly: 360 lines screened at Tel Hadya and Suran
Observations	% Germination Days of Heading — % dead plant Plant hight — % solid % infestation — Ped.length No. tillers — Stem width.
Principal scientist	R. Miller
Scientist involved	S. Ceccarelli

CEREAL IMPROVEMENT PROGRAM

BARLEY IMPROVEMENT

Grain Quality

Title	Evaluation of barley grain quality
Objective	To identify superior genotypes for feeding purposes as well as malting industries.
Location	Three location (Tel Hadya, Breda, Bouider)
Design	
Plot size	
Treatment	breeding lines .
Observations	Kernel weight, Kernel size, diastatic power, % protein, % lysine, test weight
Principal scientist	P. Williams
Scientists involved	F. J. El-Haramain, S. Ceccarelli
File name(s)	

CEREAL IMPROVEMENT PROGRAM

PROJECT II: DURUM WHEAT IMPROVEMENT

LIST OF EXPERIMENTS FOR 1986/87

The list of durum wheat experiments for 1986/87 is presented according to the following order:

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 1. Evaluation and utilization of Parents

Title	Parental Material
Objective	1) Evaluation and identification of potential parents with desirable genes for yield, potential and stability disease and insects resistance and good nutritional and technological qualities. 2) Provide the national programs with parental material with a wide range of variability. for economically important traits.
Location	Tel Hadya (3 planting dates) for the Aleppo crossing Block Landraces, dicoccoides The country germplasm and the Aleppo crossing block at Tel Hadya. 45 locations in the Region for the Regional Crossing Block (RBC)
Design	
Plot size	4 rows 2.5 m long
Treatment	
ANOVA	
Observations	Growth habit and type Days to heading Plant height Days to maturity % Protein Kernel size Stability of Performance 1000 kernel weight Disease score Plant score Head score % Lysine Agronomic score
Principal scientist	M. Nachit
Scientists involved	National Programs Scientists, O.F. Mamluk, E. Acevedo,R. Miller, and P. Williams.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 2. Evaluation of Segregating Populations

Title	Multilocation testing of Segregating Populations
Objective	Selection among and within families for desirable recombinants. Specific crosses are included to combine: a) frost tolerance and earliness b) drought resistance and heat tolerance c) Septoria resistance and good agronomic type d) Common bunt resistance and good agronomic type.
Location	Tel Hadya (early planting with irrigation, rainfed, late planting and isolation area) Breda, Terbol (summer nursery) Lattakia
Design	Unreplicated with syssematic checks
Plot size	6 rows, 5m
Treatment	F2-F_6 segregating populations
ANOVA	
Observations	Growth habit and type Days to heading Plant height Days to maturity % Protein 1000 kernel weight Disease score Head score Kernel size
Principal scientist	M. Nachit
Scientists involved	National Programs Scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Multilocation preliminary yield testing
Objective	Test the yielding ability, adaptation, disease resistance and stability of newly bulked genotypes in different environments to identify lines to be promoted to further testing .
Location	Tel Hadya (rainfed and irrigated), Terbol Breda, Cyprus, Tunisia and Jordan
Design	Randomized block design.
Plot size	4.5 msq
Treatment	21 lines and 3 checks (16 trials).

ANOVA

Source of var.	d.f.
Entries	23
Replications	1
Error	23
Total	47

Observations

Plant vigour	Days to heading
Head size	Days to maturity
Plant height	Grain yield
Disease score	% Protein
1000 kernel weight	Test weight
Vitreousness	
Sedimentation test	

Principal scientist	M.M. Nachit
Scientists involved	National Programs scientists of Cyprus, Morocco Jordan and Syria. O.F. Mamluk, R. Miller, and P. Williams.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 3. On-Site Testing

Title

Multilocation advanced yield testing

Objective

Test the yielding ability, stress tolerance to drought, heat and cold. Screen for disease and insect resistance, adaptation for the various agroclimatic conditions to identify potential varieties or parental material, and good kernel quality.

Location

Tel Hadya (early planting, rainfed, irrigated and late planting), Breda, Terbol, Tunisia (Kef, Beja), Cyprus (Laxia, Paphos and Akhela), Morocco (Kodia, Merchouche), Egypt (Shandaweel), Sudan (W. Midani), Mexico (Obregon, and Huamantla) Jordan (Deir Alla, Moshaker), Syria (Himo, Geleen, Izra), Portugal (Elvas), Germany (Hohenheim).

Design

Randomized block design for yield trials at Tel Hadya (rainfed), Breda & Terbol, and as observation nursery at the other locations

Plot size

9 msq

Treatment

21 lines and 3 checks (10 trials).

ANOVA

Source of var.	d.f.
Entries	23
Replications	2
Error	46
Total	71

Observations

Plant vigour	Days to heading
Head size	Days to maturity
Plant height	Grain yield
Disease score	Peduncle length
1000 kernel weight	% Protein
Vitreousness	Test weight
Sedimentation test	

Principal scientist

M.M. Nachit

Scientists involved

National Programs Scientists, O.F.Mamluk R. Miller and P. Williams

File name(s)

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 4. International Testing

Title

Regional Yield Trials.

Objective

Distribution of promising germplasm to the national programs.

Location

92 locations for moderate rainfall, 89 locations for low rainfall.

Design

Randomized block design.

Plot size

6 rows, 2.5 m lows

Treatment

21 lines and 3 checks (2 trials)

ANOVA

Source of var.	d.f.
Entries	23
Replications	2
Error	46
Total	71

Observations

Plant vigour	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein

Principal scientist

M. Nachit

Scientists involved

National Programs Scientists, S.K. Yau

File name(s)

DRM86D, DRL86D.

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 4. International Testing

Title	Observation nurseries.
Objective	Development and distribution of advanced genetic material to the national programs.
Location	92 locations for moderate rainfall, 89 locations for low rainfall.
Design	Unreplicated with systematic checks.
Plot size	2 rows, 2.5 m long
Treatment	120 lines for moderate rainfall, 120 lines for low rainfall.
ANOVA	
Observations	Growth habit and type Head size Plant height Disease score 1000 kernel weight Days to heading Days to maturity Plant type Grain yield Grain size % Protein
Principal scientist	M. Nachit
Scientists involved	National Programs Scientists, S.K. Yau
File name(s)	DOL86D, DOM86D.

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Breeding strategies in durum wheat
Objective	To compare three methods of selection (pedigree, modified pedigree and modified bulk).
Location	Tel Hadya irrigated, and Tel Hadya rainfed
Design	Augmented design
Plot size	6 rows, 5 m long
Treatment	100 crosses for each method
ANOVA	Source of var. — d.f.
Observations	Growth vigor, Tillering Plant height, Heading Maturity, Grain yield Head and kernel characteristics Protein percent
Principal scientist	H. Ketata, M.M. Nachit
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Physiology

Title: Screening durum wheat genotypes for coleoptile length.

Objective: To detect differences in coleoptile length of the material used in the crop physiology and agronomy trials of the durum wheat improvement projects.

Location: Tel Hadya

Design: Completely randomized bloock, 4 replication.

Plot size: 18 seeds of each genotype will be seeded in rows, at 3 cm depth, in, trays containing humid sand located in a dark germination chamber. The coleoptile length will be recorded to the nearest millimeter when coleoptiles of seedlings have been raptured by their first leaves.

ANOVA

Source of var	d.f.
Varieties	19
Reps	3
Error	57
Total	79

Principal scientist: E. Acevedo

Scientists involved: I. Naji, M. Nachit

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Physiology/Agronomy

Title: Barley and wheat land races phenology.

Objective:
a. To observe the developmental phases of two land races at various seeding dates through the year
b. To gain familiarity with Tel Hadya environment.

Location: Tel Hadya

Design: Unreplicated observation trial.

Plot size: 4 liter pots.

Treatment: One barley landrace, Arabic white, and one wheat landrace, Haurani, will be seeded in pots at monthly intervals.
Five pots of each landracewill be seeded to leave 4 plants per pot at every sowing date
The pots, filled with a clayloam mix and irrigated when needed will be kept in the neighberhood of Tel Hadya agroclimatological station.

ANOVA: Non replicated trial.

Observations:
- Planting date.
- Seedling emergence rate.
- Seedling growth (number of unfolded leaves in the main shoot).
- Tillering
- Developmnet of the main shoot.
- Stem elongation (number of detectable nodes).
- Booting.
- Ear emergence.
- Anthesis.
- Number of competent florets.
- Dry weight (total and compenents) at anthesis and harvest.

Principal scientist: E. Acevedo

Scientists involved: I. Naji.

File Name(s).

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Physiology

Title	Genotype characterization
Objective	Evaluate a theoretically derived hypothesis of crop attributes in terms of their importance in determining suitability for water stress mediterranean environments. Identify constitutive and adaptive characters.
Location	Tel Hadya, Breda, Bouider.
Design	Randomized Complete Block, 4 replicates
Plot size	2.4 m x 5 m (12 rows x 5 m long)
Treatment	20 durum wheat genotypes representing contrasting characters in early vigour, growth at low temperatures, height under stress, flowering date, grain filling period. They will also represent: varieties with high yield potential, varieties with good yield stability, pure lines isolated from landraces, the best varieties from countries served by ICARDA, lines thought to be stress tolerant, promising lines from CIMMYT's programme in Mexico.

ANOVA

Source of var.	d.f.
Varieties	19
Replications	3
Error(a)	57
Total	79

Observations

Crop establishment
Crop and plant growth and development
Dry matter, green area, ground cover through the season.
Plant traits: tiller number; leaf number, color posture, length, width, thickness, rolling, pubescence; tissue water relations; stomatal conductance and CO_2 fixation; plant height; internode length.
Yield and yield components.

Principal scientist: E. Acevedo

Scientists involved: M. Nachit, I. Naji

File name(s)

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Physiology/Agronomy

Title: Thermal stress in wheat

Object:

a) Study the effect of thermal stress on wheat growth development and production.

b) Assess the physiological effects of the late planting techniques of screening for heat tolerance.

c) Monitor the selection process for thermal stress tolerance.

Location: Tel-Hadya

Treatment

A total of 25 entries of bread wheat (22 lines + 3 checks) and 25 entries of durum wheat will be planted at three sowing dates: first week of November, middle of March and end of May, representing normal planting (probable cold stress), terminal heat stress and heat stress during the whole growing period. The entries will be selected such that they represent various stages of selection for heat stress. The plots will be sprinkled irrigated whenever the soil water tension at 40 cm depth reaches 50 cb.

Design:

A split plot experiment with 2 factors, date of sowing at 3 levels and variety (50) in a rand omized complete block design with 3 replicates. The main plots will be assigned to date of sowing and the subplots to varieties. The main plots will be 60 m long 15 m width, each subplot (variety) will be 1, 2 m (6 rows) width and 5 m long.

ANOVA:

Source of Variation	d.f.
Replicates	2
Sowing date (A)	2
Error (a)	4
Varieties (B)	49
AB	98
Error (b)	294
	449

Observation

- Days to emergence
- Crop establishment (plant No/M ^{2})
- Ground cover (every 10 days)
- Zadoks score (every 10 days)
- Apex development (every 10 days)
- Days to heading
- Dry matter and components (Heading)
- Spikelets/spike, fertile florets
- Leaf photosynthesis at vegetative stage, heading and grain filling.
- Leaf temperature
- Days to physiological maturity
- Height
- Biological yield and components at harvest (-1000 kw, - Ht. Weight).

Principal Scientists: E. Acevedo

Scientists involved: G. Ortiz Ferrara, M. Nachit and I. Naji.

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Pathology

Title	Screening for resistance to yellow rust, leaf rust, stem rust, septoria tritici,and common bunt.
Objective	Identification of new sources of resistance and elimination of suceptible material
Location	yellow rust: Tel Hadya, Raqqa, Terbol; leaf rust: Lattakia; T.Hadya (plastic houses) stem rust: Summer nursery; (Terbol) septoria: Lattakia; Ghab, R. El-Ain common bunt: Tel Hadya (isolation area)
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long or short rows (25 cm long)
Treatment	1700 lines for yellow rust, 1400 for septoria 1000 lines for common bunt 1000 lines for leaf rust 900 lines for stem rust
Observation	Disease score, Agronomic score.
Principal scientist	O.F. Mamluk
Scientists involved	J. van Leur
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Pathology

Title	Multilocation testing for multiple disease resistance.
Objective	1. To test advanced breeding material and special purpose lines for their resistance to the prevailing diseases in "hot spots" 2. To identify new sources of multiple disease resistance and eliminate susceptible material.
Location	18 "hot spot" locations within and outside the Region.
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long
Treatment	Preliminary Disease Nursery: 360 lines Key Location " " : 250 " Yellow Rust Nursery : 100 " Septoria nursery 70 "
ANOVA	
Observations	Disease score Agronomic score
Principal scientist	O.F. Mamluk
Scientists involved	J. van Leur and National Programs Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Pathology

Title	Screening for barley yellow dwarf virus (BYDV) resistance.
Objective	Identification of durum genotypes which are resistant or tolerant to BYDV infection.
Location	Tel Hadya
Design:	Three replications, two in the open field and one in the plastic house.
Plot size	Short rows (35 cm long).
Treatment	270 entries, 20 of which are repeated testing from the previous year.
Observations	Disease rating and agronomic evaluation (biological and yield, grain yield, harvest index ... etc.)
Principal scientist	K.M. Makkouk (GRP).
Scientists involved	O.F. Mamluk and J. van Leur.

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT IMPROVEMENT

Entomology

Title	Screening for resistance to wheat stem sawfly
Objective	To identify sources of resistance to wheat stem saw fly.
Location	Tel Hadya (artificial infestation) Suran (natural infestation).
Design	RCB.
Plot size	1 rows, 1 m long.
Treatment	2 reps, 360 varieties
Observation:	% Germination Days of heading Days of maturity No. of Tillering Plant height % infesed plant % dead tiller. Ped. length % solidness stem width
Principal scientist	R. Miller
Scientists involved	M. Nachit
File name	

CEREAL IMPROVEMENT PROGRAM

DURUM WHEAT PROGRAM

Grain quality:

Title	Evaluation of durum quality
Objective:	Selection of the best genotypes to make the best following products (spagetti, Bourguol, couscous and local breads)
Location	Tel Hadya
Design	Breda
Plot size	Different designs are utilized
Treatment	
Observations	1. 1000 kernel weight & Hectoliter weight 2. Vitreous 3. Pigment 4. % protein 5. SDS sedimentation 6. Milling (flour, semolina) 7. Farinograph 8. spaghetti making
Principal scientist	P. Williams
Scientists involved	M. Nachit, A. Sayegh
File name	

CEREAL IMPROVEMENT PROGRAM

PROJECT III: BREAD WHEAT IMPROVEMENT

LIST OF EXPERIMENTS FOR 1986/87

The list of bread wheat experiments for 1986/87 is presented according to the following order:

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 1. Evaluation and utilization of Parents

Title: Evaluation and utilization of parents

Objective:
1) Evaluation and identification of potential parents with desirable genes for yield, disease resistance good nutritional and industrial quality and other characteristics
2) Provide the national programs with parental material with a wide range of variability for economically important traits.

Location: Tel Hadya (3 planting dates) for the Aleppo crossing block and the regional crossing block.
Additionally, 40 locations in the Region for the Regional Crossing Block (169 lines).

Design

Plot size: 2 rows 2.5 m long

Treatment

Observations:

Growth habit and type	1000 kernel weight
Days to heading	Disease score
Plant height	Plant score
Days to maturity	Head score
% Protein	Agronomic score
Kernel size and uniformity	PSI (%)
Stability of Performance	WMFT (min)

Principal scientist: G. Ortiz Ferrara

Scientists involved: National Programs Scientists

File name(s)

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 2. Evaluation of Segregating Populations

Title	Multilocation testing of Segregating Populations
Objective	Selection among and within families for desirable recombinants by using a modified bulk method of selection.
Location	F2 Tel Hadya (early planting, rainfed planting) Breda F3 Breda, Tunis, Mexico (rainfed), Morocco Egypt, Tel Hadya (early planting)
Design	Unreplicated with systematic checks
Plot size	
Treatment	.....F2-Fn segregating populations
ANOVA	
Observations	Growth habit and type Agronomic score Disease score WMFT(min) % protein PSI (%)
Principal scientist	G. Ortiz Ferrara
Scientists involved	National Programs Scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Preliminary yield testing
Objective	Testing for yield potential and stability, disease and insect resistance of newly bulked advanced genotypes in different environments.
Location	Tel Hadya (rainfed and supplementary irrigation), Terbol, Breda
Design	Randomized block design.
Plot size	3 msq
Treatment	21 lines and 3 checks (30 trials).

ANOVA

Source of var.	d.f.
Entries	23
Replications	2
Error	46
Total	71

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein
PSI (%)	WMFT (min)

Principal scientist	G. Ortiz Ferrara
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Multilocation Advanced yield testing
Objective	Testing for yield potential and stability, stress tolerance, earliness and quality. Specific objectives are to screen for frost and earliness, for heat tolerance and earliness and for drought tolerance
Location	Tel Hadya (early planting, rainfed) Breda, Terbol, Tunis
Design	Randomized block design.
Plot size	6 msq
Treatment	21 lines and 3 checks (15 trials).

ANOVA

Source of var.	d.f.
Entries	23
Replications	2
Error	46
Total	71

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein
PSI (%)	WMFT (min)

Principal scientist	G. Ortiz Ferrara
Scientists involved	National Programs Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 4. International Testing

Title	Regional Yield Trials.
Objective	Distribution of promising material to national programs in West Asia & North Africa
Location	75 locations in the Region
Design	Randomized block design.
Plot size	6 rows 2.5 m long.
Treatment	20 lines and 4 checks (4 replications).

ANOVA

Source of var.	d.f.
Entries	23
Replications	3
Error	69
Total	95

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein
PSI (%)	WMFT (min)

Principal scientist	G. Ortiz Ferrara
Scientists involved	S.K. Yau, National Programs Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 4. International Testing

Title	Observation nurseries.
Objective	Provide genetic material to the national programs for future selection in the Region. Multilocation testing of promising advanced lines.
Location	50 locations for moderate rainfall. 45 locations for low rainfall.
Design	Unreplicated with systematic checks.
Plot size	2 rows 2.5 m long.
Treatment	102 lines for moderate rainfall, 104 lines for low rainfall.
ANOVA	

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein
PSI (%)	WMFT (min)

Principal scientist	G. Ortiz Ferrara
Scientists involved	S.K. Yau, National Programs Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Evaluation of new introductions
Objective	Identify new sources of genetic variability for several traits. Introduction and recycling of genetic material (both local and improved) from National Programs in West Asia and North Africa.
Location	Tel Hadya (rainfed and irrigated)
Design	
Plot size	2 rows 2.5 m long
Treatment	
ANOVA	
Observations	Growth habit and type Head size Plant height Disease score 1000 kernel weight Grain uniformity Days to heading Days to maturity Plant type Grain yield Grain size % Protein
Principal scientist	G. Ortiz Ferrara
Scientists involved	M. Diekmann
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	A study of bread wheat genotypes selected for drought tolerance.
Objective	Determination of plant characteristics and their variability in a range of bread wheat selected for drought tolerance. Testing and validation of SIMTAG and CERESW growth models.
Location	Tel Hadya, four planting dates, from December to March
Design	Randomized Complete Block Design, three blocks, 12 entries.
Plot size	6 rows, 10 m long
Methodology	Field research to estimate genetic parameters required as input for the growth models. Comparison of genotypic performance through simulated data from the Tel Hadya environments and other environments with sufficient meteorological data.
Observations	Phenological scores Plant density Leaf areas Disease score Dry and fresh wights Meteorological data Yield components Straw yield Harvest index Grain yield Total plant N and P
Principal scientist	H. Harris , W. Goebel (FSP)
Scientists involved	G. Ortiz Ferrara
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title — Relationship between seedling vigor and yield in dry environments.

Objective — Identify reliable criteria to select for high yield in the region.

Location — Tel Hadya (Supplementary Irrigation), Terbol, Breda

Design — Randomized Block Design.

Plot size

Treatment

ANOVA

Source of var.	d.f.
Entries	23
Replications	2
Error	46
Total	71

Observations

Growth habit and type	Days to heading
Head size	Days to maturity
Plant height	Plant type
Disease score	Grain yield
1000 kernel weight	Grain size
Grain uniformity	% Protein
Tillering ability	

Principal scientist — G. Ortiz Ferrara

Scientists involved

File name(s)

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Visual selection versus actual yield to identify superior F3 lines.
Objective	Study the effect of visual selection for quantitative and qualitative characters and yield.
Location	Tel Hadya (early planting supplementary irrigation). Three locations in the region
Design	Modified augmented design.
Plot size	
Treatment	
ANOVA	
Observations	Growth habit and type Grain yield Head size Days to heading 1000 kernel weight Plant height.
Principal scientist	G. Ortiz Ferrara
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Visual selection as a method for improving yield of bread wheat in dry environments.
Objective	Comparison of selection efficiencies for identifying high yielding lines in dry environments. PHASE II
Location	Tel Hadya (SIR), Breda
Design	
Plot size	
Treatment	
ANOVA	

Observations		
	Growth habit and type	Days to heading
	Head size	Days to maturity
	Plant height	Plant type
	Disease score	Grain yield
	1000 kernel weight	Grain size
	Grain uniformity	% Protein

Principal scientist	G. Ortiz Ferrara
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Heat tolerance screening
Objective	To identify parental material for this stress factor . Incorporation of this trait into the crossing program.
Location	Egypt (New Valley, Kom Ombo, Fayoum) Tel Hadya late planting, Terbol summer planting
Design	
Plot size	2 rows 2.5 m long
Treatment	150 advanced lines.
Observations	Growth habit and type — Grain yield Plant height — % protein Disease score — Heat score 1000 kernel weight — Aphids NO./leaf Days to heading — Aphids NO./Plant Days to maturity — Seedling evaluation.
Principal scientist	O. Shehata Khalil, Rashad Abo El-Einen
Scientists involved	G. Ortiz Ferrara, E. Acevedo and N. Rebeiz .
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Breeding: 5. Special Projects

Title	Aphids tolerance screening
Objective	To identify parental material with resistance to this insect pest. Incorporation of this characteristic into the crossing program.
Location	Egypt (Giza, Sids, Shandawil) Sudan (Wad Medani, New Halfa, Hudeiba) Tel Hadya.
Design	
Plot size	2 rows 2.5 m long
Treatment	150 advanced Bread wheat lines.
Observations	Growth habit and type — Grain yield Plant height — % protein Disease score — Heat score 1000 kernel weight — Aphids NO./leaf Days to heading — Aphids NO./Plant Days to maturity — Seedling evaluation.
Principal scientist	O. Shehata Khalil, Gallal Yousef, Bishara, Nasr El-Din Sharaf El-Din.
Scientists involved	G. Ortiz Ferrara, R. Miller .
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Physiology

Title: Screening bread wheat genotypes for coleoptile length.

Objective: To detect differences in coleoptile length of the material used in the crop physiology and agronomy trials of bread wheat improvement projects.

Location: Tel Hadya

Design: Randomized complete block design. 4 replication

Plot size: 18 seeds of each genotype will be seeded in rows at 3 cm depth, in trays containing humid sand located in a dark germination chamber. The coleoptile length will be recorded to the nearest millimeter when coleoptiles of all seedlings have been ruptured by their first leaves.

ANOVA

Source of var.	d.f.
Varieties	19
Reps	3
Error	57
Total	79

Principal scientist: E. Acevedo

Scientists involved: G. Ortiz Ferrara, I. Naji.

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Physiology

Title Genotype characterization

Objective Evaluate a theoretically derived hypothesis of crop attributes in terms of their importance in determining suitability for water stress. Identify constitutive and adaptive characters.

Location Tel Hadya, Breda, Bouider.

Design Randomized complete Block, 3 replicates .

Plot size 2.4 m x 5 m (12 rows x 5 m long)

Treatment 20 bread wheat genotypes representing contrasting characters in early vigour, growth at low temperatures, height under stress, flowering date, grain filling period. They will also represent: varieties with high yield potential, varieties with good yield stability, the best varieties from countries served by ICARDA, lines thought to be stress tolerant, promising lines from CIMMYT's programme in Mexico.

ANOVA

Source of var.	d.f.
Varieties	19
Replications	2
Error	38
Total	59

Observations

Crop establishment
Crop and plant growth and development
Dry matter, green area, ground cover through the season.
Plant traits: tiller number; leaf number color posture, length, width, thickness, rolliing, pubescence; tissue water relations; stomatal conductance and CO_2 fixation; plant height internode length.
Yield and yield components.

Principal scientist E. Acevedo

Scientists involved G. Ortiz Ferrara, I. Naji.

File name(s)

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Physiology/Agronomy

Title: Heat stress in wheat

Object:

a) Study the effect of heat stress on wheat growth development and production.

b) Assess the physiological effects of the late planting techniques of screening for heat tolerance.

c) Monitor the selection process for thermal stress tolerance.

Location: Tel-Hadya

Treatment

A total of 25 entries of bread wheat (22 lines + 3 checks) and 25 entries of durum wheat will be planted at three sowing dates: first week of November, middle of March and end of May, representing normal planting (probable cold stress), terminal heat stress and heat stress during the whole growing period. The entries will be selected such that they represent various stages of selection for heat stress. The plots will be sprinkled irrigated whenever the soil water tension at 40 cm depth reaches 50 cb.

Design:

A split plot experiment with 2 factors, date of sowing at 3 levels and variety (50) with 3 replicates. The main plots will be assigned to date of sowing and the subplots to varieties. The main plots will be 60 m long 15 m width, each subplot (variety) will be 1, 2 m (6 rows) width and 5 m long.

ANOVA:

Source of Variation	d.f.
Replicates	2
Sowing date (A)	2
Error (a)	4
Varieties (B)	49
AB	98
Error (b)	294
Total	449

Observation

- Days to emergence
- Crop establishment (plant No/M ^{2})
- Ground cover (every 10 days)
- Zadoks score (every 10 days)
- Apex development (every 10 days)
- Days to heading
- Dry matter and components (Heading)
- Spikelets/spike, fertile florets
- Leaf photosynthesis at vegetative stage, heading and grain filling.
- Leaf temperature
- Days to physiological maturity
- Height
- Biological yield and components at harvest (-1000 kw, - Ht. Weight).

Principal Scientists: E. Acevedo

Scientists involved: G. Ortiz Ferrara, M. Nachit and I. Naji.

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Pathology

Title	Screening for resistance to yellow rust, leaf rust, stem rust, septoria leaf blotch, and common bunt.
Objective	Identification of new sources of resistance and elimination of susceptible material
Location	yellow rust: Tel Hadya, Raqqa, Terbol leaf rust: Lattakia; T.Hadya (plastic house) stem rust: Summer nursery (Terbol) septoria: Lattakia, Ghab, R. El-Ain common bunt: Tel Hadya (isolation area)
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long or short rows (25 cm long)
Treatment	2000 lines for yellow rust, 1500 for septoria. 1500 lines for common bunt. 1200 lines for leaf rust 900 lines for stem rust
Observation	Disease score, Agronomic score
ANOVA	
Principal scientist	O. Mamluk
Scientists involved	J. van Leur
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Pathology

Title	Multilocation testing for multiple disease resistance.
Objective	1. To test advanced breeding material and special purpose lines for their resistance to the prevailing diseases in "hot spots" 2. To identify new sources of multiple disease resistance and eliminate susceptible material.
Location	18 "hot spot" locations within and outside the Region.
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long
Treatment	Preliminary Disease Nursery: 360 lines Key Location " " : 250 " Yellow Rust Nursery : 100 " Septoria nursery : 70 "
Observations	Disease score Agronomic score
Principal scientist	O.F. Mamluk
Scientists involved	J. van Leur, National Program Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Pathology

Title	Screening for barley yellow dwarf virus (BYDV) resistance
Objective	Identification of bread wheat genotypes which are resistant or tolerant to BYDV infection.
Location	Tel Hadya
Design	Three replications, two in the open field and one in the plastic house.
Plot size	Short rows (35 cm long)
Treatment	215 entries including 22 for repeated testing.
Observation	Disease rating and agronomic evaluation (biological yield, grain yield, harvest index ... etc).
Principal scientist	K.M. Makkouk (GRP)
Scientists involved	O.F. Mamluk and J. van Leur.

File name(s)

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Entomology

Title	Screening populations for resistance to wheat stem sawfly.
Objective	To identify sources of resistance to wheat stem sawfly.
Location	Tel Hadya: artificial infestation. Suran: natural infestation.
Design	RCB.
Plot size	1 row, 1 m long.
Treatment	2 replications 360 lines
Observations	% Germination Days to Heading Days to Maturity % Tillering Plant Height % infested plants % infested tillers Peduncle length % solidness stem width
Principal scientist	R. Miller
Scientists involved	G. Ortiz Ferrara.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

BREAD WHEAT IMPROVEMENT

Grain Quality

Title	Evaluation of bread grain quality
Objective	Selection of the best material for food processing (two and single layer flat bread, raised bread).
Location	Tel Hadya (Rainfed, irrigated)
Design	
Plot size	
Treatment	
Observations	1. Hardness 2. % protein 3. Fermentation time. 4. Test weight 5. milling 6. Baking
Principal scientist	P. Williams.
Scientists involved	F. J. El-Haramain, G.Ortiz Ferrara
File name(s)	

CEREAL IMPROVEMENT PROGRAM

PROJECT IV: HIGH ELEVATION IMPROVEMENT

LIST OF EXPERIMENTS FOR 1986/87

The list of high elevation experiments for 1986/87 is presented according to the following order:

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 1. Evaluation and Utilization of Parents

Title	Evaluation of wheat and barley germplasm from high elevation areas.	
Objective	To identify genes for disease resistance cold tolerance quality adaptation and yield.	
Location	Sargaya and Tel Hadya.	
Design	Augmented design.	
Plot size	4 rows 2.5 m long	
Treatment	160 lines	
ANOVA		
Observations	Growth habit Days to heading Plant height Days to maturity % Protein Kernel size and uniformity Frost damage	1000 kernel weight Disease score Agronomic score Yield.
Principal scientist	M. Tahir	
Scientists involved		
File name(s)		

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 1. Evaluation and Utilization of Parents

Title	Crossing block.
Objective	To develop germplasm with cold tolerance disease resistance and better quality and yield.
Location	Tel Hadya
Design	
Plot size	2 rows 2.5 m long
Treatment	150 bread wheat and 150 durum wheat lines. 100 barley lines.
ANOVA	
Observations	Growth habit Days to Heading Plant height Days to maturity % protein Kernel size and uniformity Cold tolerance. 1000 kernel weight Disease score Agronomic score.
Principal scientist	M. Tahir
Scientists involved	National Program Scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 2. Evaluation of Segregating Populations

Title	Evaluation of F2-Fn segregating populations of B.wheat and D.wheat
Objective	Multilocation breeding and testing of early segregating populations-F2
Location	T. Hadya, Pakistan (4 locations) Iran (4 locations) Turkey (4 locations) Morocco Algeria, Afganistan and India (1 location each) F3-Fn Tel Hadya.
Design	
Plot size	6 rows 5 m long
Treatment	F2 840 bread wheat and 395 durum wheat F3-Fn 5576 populations.
ANOVA	
Observations	Growth habit Days to heading Plant height Days to maturity % Protein Kernel size and uniformity 1000 kernel weight Disease score Agronomic score Frost damage.
Principal scientist	M. Tahir
Scientists involved	National Program Scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 2. Evaluation of Segregating Populations

Title	Evaluation of F2 segregating populations of winter durum and bread wheat.
Objective	Breeding and selection of early generation populations for specific adaptibility
Location	Haymana-Turkey .
Design	
Plot size	6 rows 5 m long
Treatment	800 bread wheat and 365 durum wheat F2 seg. populations.
ANOVA	
Observations	Growth habit, Frost damage, diseases score, Agronomic score, population and intra population selections.
Principal scientist	M. Tahir (ICARDA), and G. Mizrak (Turkey)
Scientists involved	Turkish cereal scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 3. On-Site Testing

Title	Initial yield trials of cold tolerant barley, bread and durum wheat, F5 and F6 populations.
Objective	To test the yield, quality and disease resistance of newly bulked lines.
Location	Turkey and Tel Hadya.
Design	Augmented design.
Plot size	4 rows 2.5 m long
Treatment	700 bread wheat lines, 330 durum wheat lines and barley 225 lines
ANOVA	
Observations	Growth habit Days to heiding Plant height. Days to maturity % protein Kernel size and uniformity Yield 1000 kernel weight Disease score Agronomic score
Principal scientist	M. Tahir
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 3. One-Site Testing

Title

Preliminary yield trials of cold tolerant barley, bread and durum wheat.

Objective

To test the yield quality and disease resistance of selected lines.

Location

Turkey and Tel Hadya

Design

Randomized block design .

Plot size

6 rows 2.5 m long

Treatment

24 barley lines
24 bread wheat lines in each of 3 trials
24 durum wheat lines in each of 3 trials.

ANOVA

Source of var.	d.f.
Entries	23
Replications	3
Error	69
Total	96

Observations

Growth habit	1000 kernel weight
Days to heading	Disease score
Days to maturity	height.
% Protein	
Kernel size and uniformity	Agronomic score
Stability of Performance	Frost damage
Yield	

Principal scientist M. Tahir

Scientists involved

File name(s)

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 4. International Testing

Title	Cold tolerant bread wheat, durum wheat and barley observation nursery.
Objective	To observe the performance of advanced material at national level for disease resistance, adaptation and yield.
Location	Fifteen high elevation sites in the region, Sargaya, Terbol, Breda and Tel Hadya
Design	Augmented design.
Plot size	2 rows 2.5 m long
Treatment	150 bread wheat lines 150 durum wheat lines and 143 barley lines.
ANOVA	
Observations	Growth habit Days to heading Plant height Days to maturity % Protein Stability of performance Yield 1000 kernel weight Disease score Agronomic score Frost damage
Principal scientist	M. Tahir
Scientists involved	National program scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 4. International Testing

Title:	Screening of winter cereals for cold tolerance
Objective:	To observe the performance of advanced winter cereal (barley, durum and bread wheat)for cold tolerance, disease resistance, adaptation and yield.
Location:	Ankara-Turkey
Design:	Observation rows with systematic checks.
Plot size:	2 rows 2-5m long.
Treatment:	1814 lines/cultivars of barley, durum and bread wheat
Observations:	Growth habit, days to heading, days to maturity; plant height, stability of performance, 1000 kw, yield, diseases, agronomic score and frost damage.
Principal scientists	M. Tahir and G. Mirzak and other Turkish scientists.

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 4. International Testing

Title	Regional Cold tolerant barley, bread and durum wheat yield trials
Objective	To test cold resistance, yield and disease resistance of advanced lines.
Location	Fifteen high elevation sites in the region and Tel Hadya
Design	Randomized complete block design.
Plot size	6 rows 2.5 m long
Treatment	24 barley lines 24 bread wheat lines and 24 durum wheat lines
ANOVA	
Observations	Growth habit Days to heading Plant height Days to maturity % Protein Kernel size and uniformity Stability of performance Yield 1000 kernel weight Disease score Agronomic score Frost damage
Principal scientist	M. Tahir
Scientists involved	National program scientists
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 5. Special Projects

Title	Evaluation and utilization of Triticum and Aegilops species
Objective	To derive genes of desirable agronomic traits for incorporation in durum and bread wheat.
Location	Tel Hadya , Breda and Sarghaya.
Design	
Plot size	2 rows 2.5 m long
Treatment	1650 Aegilops and wheat species and seg. populations (F_1-F_5).
ANOVA(1)	
Observations	Growth habit and type Days to heading Plant height. Days to maturity % Protein Kernel and uniformity Total biomass 1000 kernel weight Disease score Agronomic score Frost damage Grain yield.
Principal scientist	M. Tahir
Scientists involved	GRU Scientists.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 5. Special Projects

Title	Introduction and evaluation of exotic winter type durum and bread wheat material.
Objective	Evaluation of new winter type wheat lines/varieties for direct or indirect use in the germplasm develoment for high altitude areas of ICARDA region. To develop cooperation with the other national and international wheat breeding programs.
Location	Tel Hadya
Design	Yield trials in RCB 4 Replications. Observation Nurseries Augmented design.
Plot size	Yield trials (IWWPN) 6 Rows 2.5 m long and Observation Nurseries 2 rows 2.5 m long
Treatment	Two yield trials 30 entries each. Observation Nurseries (216 IWSWSN + 26 Irani + 200 Turkish)

ANOVA

Observations	Growth habit and type	1000 kernel weight
	Days to heading	Disease score
	Plant height.	Frost Damage
	Days to maturity	
	Protein	Yield

Principal scientist	M. Tahir
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Breeding: 5. Special Projects

Title:	Evaluate bread and durum wheat advanced lines to identify genetic differences in premordia development.
Objective:	Screening of advanced bread and durum wheat lines for cold/frost tolerance and earliness on the basis of primodia development.
Locations:	Tel Hadya
Design:	RCB, 3 replications
Plot size:	2 rows 2.5m long.
Treatment	30 entaries each of durum and bread wheat.
ANOVA:	
Observation:	Growth habit Days heading Days to maturity Plant height, 1000 kw, Disease score, Frost damage, Yield and primodia development readys,
Principal Scientsits	M. Tahir and T. Hoshino

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Pathology

Title	Screening for resistance to yellow rust and common bunt.
Objective	Identification of new sources of resistance and elimination of susceptible material
Location	yellow rust: Tel Hadya common bunt: Tel Hadya (Isolation area)
Design	Unreplicated with systematic checks
Plot size	2 rows 1 m long
Treatment	400 from ICARDA, for Yellow rust 400 from ICARDA, for Common bunt
Observations	Disease score
Principal scientist	O.F. Mamluk
Scientists involved	J. van Leur
File name(s)	

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Pathology

Title:	Screening of T.dicoccoides and T.monococcum for BYDV, yellow rust and common bunt
Objective	Identification of new sources of disease resistance.
Locations	Tel Hadya
Design	Unreplicated with systematic checks.
Plot size	2 rows 1m long.
Treatment:	245 lines of T. dicoccoides and 181 of T. monococcum
Observations	Disease score
Principal scientists	O.F. Mamluk for yellow rust and common bunt K. Makkuk for BYDV.
Scientists involved	J. van Leur, and M. Tahir.

CEREAL IMPROVEMENT PROGRAM

HIGH-ELEVATION CEREAL IMPROVEMENT

Grain Quality

Title	Evaluation of Triticum and Aegilops species
Objective	To derive desirable grain quality gene(s) for incorporation in new wheat germplasm.Testing of new lines/varieties for grain quality.
Location	Tel Hadya
Design	
Plot size	4 rows, 2.5 meter each
Treatment	250 lines
ANOVA	
Observations	1. 1000 kernel weight 2. Test weight 3. % Protein 4. Hardness 5. Fermentation time 6. SDS sedimentation
Principal scientist	P. Williams
Scientists involved	M. Tahir, F.J. Haramain GRU Scientist.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Survey of cereal insects in Syria
Objective	To systematically survey in detail important cereal insect pests in Syria.
Location	Syria.
Sampling Methods	Vary with target insects
Observations	Qualitative and quantitative population description initially concentrating on wheat stem sawfly, suni bug, Hessian fly, aphids
Principal scientist	R. Miller,
Scientists involved	Scientists from National program

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Collaboration with U.S. Institution to be named later by USAID

Title	Screening wheat and barley for resistance to Hessian fly
Objective	To identify sources of resistance to Hessian fly
Location	Morocco.
Design	
Plot size	
Treatment	
Observations	
Principal scientist	National Scientists from Morocco, R. Miller, M. Mekni
Scientists involved	
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Screening for resistance to cereal aphids
Objective	To identify sources of resistance to cereal aphids.
Location	Egypt: artificial infestation and natural infestation. Sudan: natural infestation, 3 locations.
Design	Augmented design.
Plot size	2 rows, 2.5 m long.
Treatment	144 lines of barley (F3-86) 210 lines of durum (ADYT-86) 160 lines of bread wheat (WCB-86)
Observations	% Germination. % infested Plant % dead plant. Visual score from 1 to 5. aphid identification, weather maxmin temps, rainfall/irrigation
Principal scientist	National Scientists from Egypt and Sudan
Scientists involved	R. Miller, G. Ortiz Ferrara M. Nachit, S. Ceccarelli.
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title: Evaluation and Documentation of Durum Wheat Germplasm

Objective: The objective of the project is to provide national and international cooperating institutions involved in durum wheat breeding with a comprehnesive data base comprising of substantial information on morphological and agronomic characters, disease resistances, stress tolerances, of five thousands germplasm accessions from different origins. Concurrently seed multiplication is being carried out. The project includes the following sub-projects and locations where the same accessions will be evaluated.

1. Characterization and evaluation of 5000 durum germplasm accessions, at Tel Hadya and Breda.
2. Evaluation of 5000 durum accessions for Yellow rust and Common bunt resistance at Tel Hadya.
3. Evaluation of 5000 durum accessions for grain quality characteristics at Tel Hadya.
4. Multiplication, storage and distribution of 5000 durum accessions.
5. Documentation of the data on 5000 durum accessions collected from Tel Hadya and Breda.
6. Evaluation of 5000 durum accessions for Agronomic, and morphological characters as well as diseases resistance at INRA, Tunisia.
7. Evaluation of 8000 durum accessions for electrophoretic analysis at University of Tuscia, Viterbo, Italy.
8. Further evaluation of 225 durum accessions for tolerance of combined effects of cold, drought at Breda and Tel Hadya.
9. Further evaluation of 225 durum accessions for the tolerance to the combined effect of cold, drought and soil salinity, at Hegla.

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project I	Characterization of 5000 durum germplasm accessions and evaluation of their adaptation to moderate (Tel Hadya) and severe (Breda) drought conditions
Location	Tel Hadya and Breda
Treatment	5000 accessions
Design	Augmented design (3 checks)
Plot size	Tel Hadya: 4 rows, 2.5 cm long Breda: 1 rows, 30 cm long
Observation	For both locations: Early vigour, days to heading, productive Tillering capacity, Days to maturity Plant height, Agronomic score Only for Tel Hadya: Emergence, growth habit, Awnedness, Waxiness of plant, lodging resistance, spike length, spike density, number of seeds/spikelet, yield.
Principal scientists	J.P. Srivastava, B. Somaroo, A.B. Damania
Scientists involved	P. Annicchiarico, L.Peccetti (in both locations) B. Humeid (in Tel Hayda).

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title:	Evaluation and Documentation of durum wheat Germplasm
Sub-project II:	Evaluation of 5000 durum accessions for yellow rust resistance and for common bunt resistance in the field under artificial epiphytotics conditions.
Locations:	Tel Hadya
Treatment:	5000 accessions under artificial inoculation
Design:	Unreplicated plots with 2 checks.
Plot size:	1 row, 30 cm long
Observation:	Yellow rust susceptibility, common bunt (according to standard reading scale).
Principal scientist:	J.P. Srivastava, O.F. Mamluk, A.B. Damania
Scientists involved:	L. Pecetti, P. Annicchiarico.

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project III	Evaluation of 5000 durum accessions for grain quality characteristics.
Location	Tel Hadya
Treatment	5000 durum accessions grown at Tel Hadya under rainfed conditions.
Design	P x P simple augmented design, with 2 checks.
Plot size	4 rows, 2.5 m long.
Observations	1000 kernel weight, vitreousness, seed colour. Protein content.
Principal scientists	J.P. Srivastava, A.B. Damania
Scientists involved	A. Sayegh, F.J. Haramain, L. Pecetti P. Annicchiarico.

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project IV	Multiplication, storage and distribution of 5000 durum accessions.
Location	Tel Hadya
Treatment	
Design	
Plot size	
Principal scientists	B. Somaroo , A.B. Damania
Scientists involved	B. Humeid
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project V	Documentation of the data on 5000 durum accessions collected from Tel Hadya and Breda
Location	Tel Hadya.
Principal Scientist	B. Somaroo, A.B. Damania, J.P. Srivastava
Scientists involved	P. Annicchiarico, L. Pecetti
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project VI	Evaluation of 5000 durum accessions for morphological and Agronomical characters and disease resistance
Location	INRA, Tunisia
Principal Scientist	M. Daaloul
Scientists involved	T. Dalel, H. Moncef
File name(s)	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project VII	Evaluation of 8000 accessions of durum wheat for electrophoretic analysis
Location	University of Tuscia, Viterbo, Italy
Observation:	15 single seed analysis per accession
Principal scientist	E. Porceddu,
Scientists involved	Dominici, Grottannelli
File name:	

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project VIII	Further evaluation of durum accessions for drought tolerance
Location	Breda and Tel Hadya
Treatment	225 accessions (selected from 85-86)
Design	Simple Lattice design with two checks
Plot size	6 row, 2.5 m long
Observations	Emergence/Early vigour Days to heading Plant height Days to maturity Agronomic score Yield
Principal scientists	J.P. Srivastava, A.B. Damania
Scientists involved	L. Pecetti, P. Annicchiarico,

CEREAL IMPROVEMENT PROGRAM

COLLABORATIVE PROJECTS

Title	Evaluation and Documentation of Durum Wheat Germplasm
Sub-project IX	Further evaluation of durum accessions for tolerance to the combined effect of cold, drought and soil salinity.
Location	Hegla
Treatment	225 accessions (selected from 85-86)
Design	triple lattice design, with 3 check.
Plot size	4 row, 2.5 m long
Observation	Emergence/Early vigour Agronomic score; 3 times: - Vegetation phase - heading stage - maturity
Principal scientists	J. P. Srivastava, A.B. Damania
Scientists involved	P. Annicchiarico, L. Pecetti.

CEREAL IMPROVEMENT PROGRAM

TRAINING 1987

Training activity	No.of candidates	Duration and place	Country	Source of funds
1. Residential course	15	3 1/2 months (1 March-18 June)	Syria,Turkey, China,Egypt, Morocco,Algeria Iran, Yemen AR, Sudan,Pakistan, Iraq, S.Arabia Jordan,Tunisia, Lybia	ICARDA and other sources: (USAID,AOAD,etc).
2. Short courses:				
a. Barley improvement	10	2 weeks: (1-12 March) Aleppo,Syria	China, Morocco Algeria,Ethiopia Turkey,India,Iran Egypt, Syria,Jordan	ICARDA
b. Cereal disease methodology	6	2 weeks (1-15 April) Aleppo,Syria	Syria,Morocco, Algeria, Turkey Ethiopia, Oman	ICARDA
c. Germplasm Evaluation of cereal landraces and wild relatives	10	2 weeks (10-21 May) Aleppo,Syria	Syria, Tunisia, Turkey, Jordan,Iran Ethiopia,Algeria,India Pakistan	ICARDA

d. In-country course: Cereal (and Food legume) improvement		1 week (April) Sidi Bel Abbas	Algeria	Algeria/France/ ICARDA
e. In country course: Cereal and Food legume improvement	25	1 week (June) Sidi Bel Abbas	Algeria	Algeria/France ICARDA
f. In country course Breeding strategies for Cereal improvement	20	4 days (September) Cairo	Egypt	ICARDA
3. Individual Training				
a. Research associate				
- Interspecific hybridization	2	2 weeks (April)	Turkey, Iran	ICARDA
- Grain quality	4	2 weeks (Feb.)	Turkey,Morocco Algeria	ICARDA
- Physiology/Agronomy	1	2 months (March-April)	Syria	ICARDA
	1	1 month (15 March-15 April)	Turkey	ICARDA
- On-farm trials	2	3 weeks (April-May)	Tunisia Jordan	ICARDA
- Entomology	2	2 weeks (1-15 April)	Syria, Egypt Iran	ICARDA
- Statistical data analysis	5	2 weeks (Jan.-Feb.)	Syria, Algeria	ICARDA
b. Senior research associate				
- Barley improvement	1	4 months	Syria	ICARDA

- 98 -

c. Research scholar (degree training)

- Cereal physiology (MSc.)	1	1 year	Spain	self-financed
- Cereal physiology (MSc.)	2	1 year	Sudan	ICARDA
- Cereal physiology (Ph.D)	1	1 year	Spain	self-financed
- Durum wheat breeding (Ph.D)	1	1 year	Germany (FR)	Self-financed
- Wheat breeding (Ph.D)	1	1 year	Tunisia	ICARDA
- Cereal physiology (Ph.D)	1	1 year	Tunisia	ICARDA
- Stress physiology (Ph.D)	1	1 year	Algeria	ICARDA
- Barley pathology (MSc)	1	1 year	Lebanon (AUB)	ICARDA
- Barley pathology (MSc)	1	1 year	Morocco	USAID (Barley project)

4. Regional visiting scientist

- Stress physiology	1	3 months	Sudan	OPEC
- Bread wheat breeding	1	3 months	Sudan	OPEC
- Barley improvement	1	1 month	Turkey	ICARDA
- Barley pathology/breeding	1	3 months	Ethiopia	ICARDA
- Cereal pathology	1	2 weeks	Portugal	USAID
- Barley improvement	1	1 month	Nepal	ICARDA
- Barley improvement	1	1 month	China	ICARDA
- Barley improvement	1	1 month	Egypt	ICARDA

- 99 -