

REPUBLIC OF TUNISIA
MINISTRY OF AGRICULTURE

INTERNATIONAL CENTER
FOR AGRICULTURAL RESEARCH
IN THE DRY AREAS (ICARDA)

TUNISIA / ICARDA
Cooperative Projects

REPORT OF THE SIXTH ANNUAL
Coordination Meeting

12 - 14 SEPTEMBER 1981
TUNIS - TUNISIA

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PREFACE

The Sixth Tunisia/ICARDA Coordination Meeting was held at the Institut National de la Recherche Agronomique de Tunisie (INRAT), Tunis during the period September 13 and 14, 1988.

This report presents an abstract of this meeting and includes the highlights of 1987/88 results of the collaborative projects on Cereal Improvement, Food Legume Improvement and Farming Systems as well as the work plan for 1988/89 crop season. The training needs, staff education, workshops and budget by project are given. Recommendations in some areas are also indicated.

The Annual Progress Reports for these projects as well as the special reports and publications on specific activities are produced separately and are available on request.

Sixth Tunisia/ICARDA Coordination Meeting

September 13 and 14, 1988

The Sixth Coordination Meeting between Tunisia and ICARDA was held at the Institut National de la Recherche Agronomique de Tunisie (INRAT) during the period September 13 and 14, 1988.

The program of the meeting and list of participants are presented at the end of this document (Annex 1 and 2).

The meeting went as follows:

- | | |
|--------------|--|
| September 13 | - Opening session and presentation highlights of the different projects.
- Concurrent sessions of the projects;
Review of 1987/88 results. |
| September 14 | - Research plans for 1988/89 crop season
- Presentation; summary 1988 results and 1989 plans.
- Closing session |

Opening Session

Dr. M. Lasram; Director of INRAT chaired this session. He welcomed the Secretary of State for Agriculture; Mr. Mohsen Boujebel who attends this meeting for the first time and Mrs. F. Larbi; International Cooperation, Ministry of Agriculture. He also welcomed ICARDA staff attending the meeting as well as the national researchers, from the various institutes.

He indicated that to introduce the activities of the various projects, the national coordinators will briefly present to the group attending this session, the highlights of this year's findings. This will be followed by the concurrent sessions in which the national and ICARDA researchers will discuss in details this year's results and develop the plans for coming season's research.

Dr. Lasram gave a historical review of the cooperation between Tunisia and ICARDA that started as early as 1980. Following the signing of the agreement of cooperation between ICARDA and the Government of Tunisia, ICARDA responded to a request from the Ministry of Agriculture in 1980 to post a cereal researcher to work on barley improvement and cereal pathology. This was followed by posting for food legumes a breeder and a research associate in 1981 and later in 1984 a representative/coordinator for ICARDA supported activities as well as a farming systems agronomist in the same year.

Dr. Lasram highly commended this cooperation and indicated that as a result of this association, INRAT for the first time released in 1985 three barley varieties and in 1987 a fourth variety; a six-rowed barley. The cereal program also released a high yielding durum wheat and a bread wheat in 1987.

Similarly in the area of food legumes, three chickpea and two lentil varieties were released in 1987. This also is the first release of food legume varieties in Tunisia. The agronomic practices for these legumes were developed to allow high production.

The farming systems project has also made headways and upon the completion of the overdue analysis of the survey data, some recommendations could be given in agronomic practices, rotations and livestock managements for groups of farmers of the semi-arid zones of the country.

Dr. Lasram indicated that these projects are funded either from ICARDA core budget like cereal improvement or share funding with IDRC as a donor organisation as the food legume improvement project and the farming systems project. He mentioned that the budget of these projects is not big but the money has always been very efficiently used.

He indicated that through this cooperation a big number of junior researchers are trained annually in ICARDA and majority of the national staff in these projects attended one or more of ICARDA's training courses. He added that ICARDA's support in training is not restricted to the non-degree type but also for post graduate research leading to MSc and Ph.D degrees. Dr. Moncef Ben Salem, the Head of the Cereal Technology Laboratory at INRAT is the first who terminated his research successfully and got his Ph.D with ICARDA financial and technical support. Moreover about 40 Tunisian researchers benefit from ICARDA training opportunities annually or attend regional or international workshops sponsored by ICARDA.

Dr. Lasram also indicated that the cooperation with ICARDA started with INRAT and has developed to include researchers from INAT, ESAK and Office des Céréales. He commended this integration of efforts of the national researchers. He praised the dedication and efforts the national coordinators and their associates are giving to these projects and indicated that his concern is essentially the limited number of researchers in each of the major commodities.

He mentioned that for the last few years three different projects on farming systems research are being carried out in Tunisia. These are the French project, the USAID-MIAC project and ICARDA one. Each of these came with various results that need to be evaluated and some could be transferred directly to the farmers in the semi-arid zones of the country. A meeting for researchers of the three projects involving scientists from the different disciplines is necessary to put the information and experience gained across projects on systems of production for farmers use in these zones.

He concluded by saying that leaders of all ICARDA research programs attended last year's coordination meeting while this year none of them came and wished this does not indicate that ICARDA is giving less importance now to the collaboration with Tunisia.

Mr. M. Boujebel thanked Dr. Lasram for the overview he gave for the collaboration with ICARDA and indicated that the association of researchers from the various institutes; INRAT, INAT, ESAK and Office des Céréales in the collaborative projects with ICARDA is a very healthy approach that resulted in the valuable achievements Dr. Lasram mentioned in varietal release, identification of production packages etc. All these institutes work to increase or help increasing production for Tunisia and their effort will be more significant when they work together as a team.

He added that the role of ICARDA in supporting the national program in these important areas and in building the manpower need of Tunisia is recognised and very much appreciated. The absence of ICARDA program leaders from this meeting might indicate their satisfaction with this cooperation and the smoothness with which the research collaboratively planned is conducted. The presence of senior researchers from each of ICARDA's programs indicate however the commitment and support ICARDA gives to these projects.

Regarding the delay in analyses of the previous years survey data, Mr. Boujebel indicated that he will be glad to provide any assistance needed to have these analyses completed.

He welcomed the idea of a joint seminar/meeting for researchers of the three projects on production systems and indicated this has all his support.

He thanked Dr. Lasram and ICARDA for inviting him to this important meeting and indicated that by attending he learned more of the excellent work conducted and wished all researchers good meetings and good programs for Tunisia and the region.

With this, the opening statements came to an end and the national coordinators for the food legume project and the farming systems project presented the highlights of their 1987/88 results. This was followed by concurrent meetings of researchers from each project to review and discuss in details the 1987/88 results and prepare the 1989 plans of work. The second part of the last day; September 14 was devoted to the presentation of the summaries. These are presented in the following pages.

CEREAL IMPROVEMENT PROJECT

I. Participants

Mr. A.R. Maamouri, INRAT	Dr. A. Daaloul, INAT
Mr. M. Deghais, INRAT	Dr. M. Harrabi, INAT
Mr. M. El Felah, INRAT	Mr. R. Sayoud, ITGC, Algeria
Mr. M.S. El Gharbi, INRAT	Dr. M. Nachit, ICARDA, Syria
Dr. M. Ben Salem, INRAT	Dr. M.S. Mekni, ICARDA, Morocco
Mr. M. Mosbahi, INRAT	Dr. A.H. Kamel, ICARDA, Tunisia
Mrs. F. Laribi, Office des Céréales	

II. Introduction

An overall review of the climatic conditions that prevailed during the 1987/88 crop season was presented by Mr. Maamouri. The season was characterized by a severe drought that affected all the cereal growing regions of the country and resulted in a very poor production. The deficit in rain was however variable between regions, while drought was almost total in the intermediate zones of Fahs, Medjez, Kef and Siliana, the total rainfall was 30-40% lower than the annual average in the high rainfall areas of the north west; Mateur, Beja, Jendouba, le Krib. This last region is considered the most productive area of the country and covers about 200.000 hectares.

The rain was not only scarce but also badly distributed. During the critical stages of tillering and grain production no rain occurred. The average temperature was also higher than normal during winter months and few days of Sirocco affected grain filling in various locations particularly in the region of Bou Salem. This drought was the most severe in this century.

The total production is estimated at about 300.000 tons of cereals. Out of this about 50% was stored by the farmers and not traded. This year's production is about 15% of last year's production. As a result of the drought and Sirocco the crop was in general of poor quality and seeds were shrivelled.

At the research level the season was favourable for a very efficient screening for drought tolerance/resistance.

III. Highlights of the 1987/88 Crop Season

1. Durum Wheat

In commercial production, the yield of the variety Ben Bechir was affected by the difficult conditions of this year particularly the mild winter and high average temperatures. The variety Karim performed well in the areas where drought was not very severe, however in drier areas the yield was badly affected. The only variety that tolerated the difficult conditions of this season was the newly released variety Razzak 87. It outyielded the variety Karim in all stations by 15 to 20%.

In the advanced yield trials, many lines were as good yielders as Razzak 87 and significantly higher yielders than Karim. None of these lines however outyielded the newly released variety Razzak 87.

In the preliminary yield trials grown at Beja about twenty lines outyielded Razzak by 8 to 20%. These lines will be followed particularly for the regions of medium rainfall. Moreover, various selections of the variety Om Rabi of ICARDA gave excellent yield levels in these dry conditions.

2. Bread Wheat

In commercial production and inspite of the drought, the variety Salambo gave good yields and showed its adaptation to these difficult conditions. On the other hand, the variety Tanit was the most affected. Similarly the newly released variety Byrsa suffered from drought. This confirms that this last is adapted to the more favourable conditions.

During this season five advanced yield trials were grown in the different stations same as eight trials of first year. Out of the 312 lines yield tested, 87 were selected of which 57 gave a yield superior or equivalent to the best check. These will be retested coming season.

Various selections from following crosses were superior in yield in this dry year.

Vee "S" / Snb "S"	CM 61981
4777*2//Fkn/Gb/3/Vee "S"/4/Buc"S"/Pvn"S",	CM 66684
Bow"S" / Vee "S"	CM 64693
Kauz "S"	CM 67458

Moreover, 11 observation nurseries comprising 2661 lines were evaluated at Beja. Out of these 113 lines were selected based on their yield potential, superior agronomic type, resistance to septoria as well as tolerance to drought. 99 of these will be yield tested coming season and remaining entries will be used in the crossing program.

The crossing program planned for this year was fully realized and 366 crosses were made.

The total of 3162 F2 to F4 populations were grown this season. Due to the drought conditions, selection was essentially conducted for drought tolerance. 927 F3, 106 F4 and 154 F5 plants were selected. In addition 38 homogeneous and high yielding F4 families were bulk harvested. These will be yield tested in replicated plots coming season.

3. Barley

In commercial fields, the varieties Rihane and particularly Roho confirmed their high yield potential inspite of the drought conditions.

All the planned research work in 1987 coordination meeting was carried out. This was conducted in five stations ranging from sub humid at Beja and Bou Salem to semi arid at Hindi Zitoun, le Kef and Tejrourine.

Due to the severe drought that characterized this crop season the trials at the dry sites of le Kef and Tejrourine were abandonned. To get meaning-full results yield trials and observation nurseries grown at Hindi Zitoun were irrigated.

This season was very favourable for an efficient screening for drought tolerance/resistance and some lines significantly outyielded the check varieties Rihane and Roho.

The results of yield trials conducted at Beja, Bou Salem and Hindi Zitoun confirmed again the superior performance of Rihane and particularly Roho in stress prone stations.

At Beja the variety Deir Alla 106//DL 71/Strain 205 outyielded the check varieties; it yielded 3.186 kgs/ha compared to 2.902, 2.464 and 1.844 kgs/ha for Rihane, Ceres and Faiz respectively.

The variety Roho was superior in almost all trials at Hindi Zitoun confirming its adaptation to the arid and semi arid zones. Some lines outyielded Roho significantly at Hindi Zitoun. These are WI 2291, Assala-01 and Man/4/Bal 16/Pro//Apur Dwarf II-1Y//3/Api/CM 67. These varieties yielded 4.224, 4.054 and 3.928 kgs/ha compared to 3.500 kgs/ha for Roho. At Bou Salem, the varieties WI 2197/Arabische and Harisson/Nopal outyielded significantly the varieties Rihane, Roho and Taj.

In the international trials the only variety that outyielded Rihane (3.025kgs/ha) was the variety CI 08887/CI 05761 (4.121 kgs/ha).

From the observation nurseries 153 lines were selected as they showed a high yield potential and resistance to diseases particularly scald.

4. Agronomic Research and On-Farm Verification/Demonstration Trials

Some agronomic trials were conducted at Beja station to answer various questions raised by farmers. These included; seed rates for the newly released varieties, potassium fertilization, seeding date and seed rate for triticale and comparison of yield levels of the various cereal crops when grown following cereals. The results of the first three experiments did not show significant difference between treatments this year. The last trial confirmed for the second year that out of the four crops; durum wheat, bread wheat, triticale and barley, in low rainfall, barley after barley gives a higher yield compared to the other crops. On the other hand triticale in more favourable conditions; higher rainfall, gives a superior yield than the others when grown following a cereal crop.

The on-farm verification/demonstration trials conducted by the Direction de l'Amélioration de la Production (DAP) of the Office des Céréales included variety performance trials, nitrogen and potassium response trials, seeding date and seed rate as well as weed control trials. The results obtained in general are in agreement with previous years and INRAT's results and confirmed the high yield potential of the durum wheats Razzak and Karim, the bread wheats Salambo and Byrsa and the barleys Rihane and Roho.

5. Cereal Quality

Quality characteristics are important factors in acceptance of newly developed germplasm. In this respect the Cereal Technology laboratory at INRAT plays a leading role. In this area, seed samples of the germplasm selected by the project have been provided to the laboratory for characterization for the major quality parameters and about 5000 tests have been carried out. Following aspects were studied:

5.1. The effect of irrigation regimes on the yield and seed quality of durum wheat, bread wheat, barley and triticale and the adaptation of triticale to dry and acid soils. Results of this study will be summarized upon completion of the analysis. Triticale however has shown a great adaptation in the region of Sedjnane.

5.2. Quality Parameters

The results of the 1987/88 crop season for the durum trials grown at Mateur, Beja, Bou Salem and le Krib showed a significant decrease in the 1000 kernel weight, specific weight and vitreousness and an increase in the protein content. Out of the durum varieties evaluated, the variety Ben Bechir was characterized by a significantly higher 1000 kernel weight than any other variety tested. This was across trials and stations.

6. Wheat Genetics and Breeding - INAT

The wheat genetics and breeding program of INAT has conducted several activities aiming toward reinforcement and complementarity with the national Cereal Improvement Program. The Tunisia/ICARDA Collaborative Cereal Research Project has permitted to establish links between the INAT program and the Durum Wheat Germplasm Evaluation Network (ICARDA/Italy). Within this network INAT has evaluated a collection of 200 lines of durum wheat at Mornag. The nursery has suffered from the drought that prevailed all along this season. Because of some supplementary irrigation given during April and May (total amount of about 100mm), plant development has improved and notes on tillering, plant height and 1000 kernel weight were taken. Earlier notes on drought tolerance were made. Out of this set 16 lines were selected for their drought tolerance, and their high 1000 kwt; better or equivalent to Karim. These lines will be provided to INRAT for further evaluation and use. The detailed report on this evaluation was submitted to ICARDA.

7. Cereal Pathology

7.1. Germplasm Evaluation

All germplasm included in the various disease nurseries was planted at Beja station and subjected to artificial inoculation of different diseases. Wheat was inoculated repeatedly by yellow rust and septoria while barley was inoculated by scald and net blotch.

The drought conditions that prevailed last season as well as the higher temperatures during the winter months prevented yellow rust development on wheat inspite of the repeated inoculations. On the other hand the development of Septoria tritici was enhanced by sprinkler irrigation. This allowed a reasonable disease development and selection for resistance. The total of 120 durum wheat lines in addition to 130 bread wheats were selected for resistance to septoria from international observation nurseries. These were incorporated in the national program germplasm. In barley, scald development was satisfactory following three inoculations and about 7% of the germplasm generated in the international barley nurseries and 25% of the Tunisian observation nurseries were selected as having good agronomic types and resistance.

The development of net blotch was less than expected inspite of various inoculations.

7.2. Disease Monitoring

This last year a Cereal Disease Monitoring Nursery was developed and grown in 24 locations in Tunisia, 2 in each of Algeria and Morocco and one at ICARDA station in Aleppo. This nursery has as objectives:

- a. To help determine the prevalent diseases in each crop season and the virulence spectrum of the pathogen population.
- b. To help determine the potential for disease development in the major wheat and barley growing areas.
- c. To provide information on which variety can be recommended or should be withdrawn from commercial production.
- d. To detect changes in the virulence pattern and provide advance warning to the breeding programs of these shifts.
- e. To assist in mapping the movement and geographical spread of diseases especially those which transit international borders.

Due to the drought conditions that prevailed last season in Tunisia and Algeria the development of diseases was very limited and some diseases particularly the three rusts did not develop. In Tunisia disease information was collected from 12 sites only and diseases scored were powdery mildew, barley yellow dwarf and septoria on wheat and scald, net blotch, powdery mildew and barley yellow dwarf on barley. A report summarizing the results obtained from Tunisia, Morocco and Aleppo and future projections was produced and circulated to the national collaborators.

Research on cereal pathology is also conducted at INAT as a major back-up component of the national Cereal Improvement Program. It included following components.

7.3. Identification of sources of resistance to net blotch and scald in barley and to septoria in wheat

Two ICARDA barley nurseries; BON-LRA and BCB were evaluated for resistance to various isolates of net blotch and scald at the seedling stage. For net blotch four isolates were used; these are from Cyprus, Morocco, Egypt and Syria, while for scald these were six isolates originating from Beja, Siliana and le Kef of Tunisia, Khemisset and Ifrane from Morocco and Tel Hadya from Syria. The results show that 55 varieties were resistant to the net blotch isolates and only 8 varieties to the scald isolates used. Moreover none of the varieties tested was resistant to all isolates of net blotch and scald. This shows that ICARDA should give special emphasis to multiple disease resistance in the germplasm generated particularly for barley. Analysis of this data is underway and will be reported along with future strategies.

For septoria the total of 1905 lines of the Durum World collection were evaluated for septoria resistance at the seedling stage. Seventeen percent of these lines were resistant, 56% intermediate and 27% susceptible. A detailed report of this evaluation was submitted to ICARDA.

7.4. Virulence Survey of *Pyrenophora teres* and *Rhynchosporium secalis* in ICARDA Region

The virulence spectrum of 33 isolates of *P. teres* was evaluated using 10 barley cultivars as differential set. The isolates were collected from Tunisia, Algeria, Morocco, Egypt and Cyprus. A cluster analysis showed the isolates belonged to four groups. The North African isolates had higher mean virulence than those of Egypt and Cyprus and none of the varieties tested was resistant to all isolates. A publication related to this investigation was submitted.

7.5. Disease Survey in the Maghreb Countries

A disease survey was conducted in Morocco only. Because of the severe drought, Tunisia and Algeria were dropped from the original plan. In Morocco most of the major cereal diseases were observed and some collections were made. A summary report on this survey will be prepared soon.

7.6. Thesis Research

a. Minor gene resistance to net blotch (Ms. Majda Cherif): Defended March 1988.

This study clearly showed that resistance achieved from crosses between susceptible cultivars is conditioned by additive gene action and by epistatic effect of the additive x additive type. Complete resistance based on a 0 and 1 infection types on the 0-4 scale was obtained at the F3 generation. This study points out the necessity of crossing high yielding susceptible cultivars to develop non-specific resistance.

b. Yield loss estimate to net blotch and septoria (Mr. Kamel Cherif).

This study was designed to accurately evaluate yield losses due to these two diseases. It is expected that this thesis be defended October-November 1988.

c. Race non-specific resistance to net blotch in barley (M. Limam from Mauritania).

This thesis is a continuation of Ms. Majda Cherif's work to verify the non specificity of resistance in lines identified as carrying minor genes for resistance.

IV. Workplans for 1988/89 Crop Season

1. Cooperation between INRAT, INAT, Office des Céréales and ICARDA will continue. ICARDA will continue its support to the national program to increase production of all cereal crops in the major production areas.

2. Research in the areas of breeding, agronomy, cereal quality, pathology and on-farm verification/demonstration will continue as in the previous year.

3. Some reorientations follow:

3.1. More emphasis will be given for breeding wheats for the semi-arid areas of le Kef.

3.2. Evaluation of advanced promising lines of wheat to various isolates of Septoria tritici at seedling stage. This will complement adult plant testing.

4. Training

Provision is made for following:

- One individual short term training for a researcher from INRAT in durum wheat. Proposed period for the training during March/April 1989.
- Two short term training for INRAT and INAT in cereal pathology.
- One short term training in cereal quality.

5. Workshops and Surveys

- A Cereal Travelling Workshop is planned in Tunisia and Algeria. It is proposed to start the workshop May 10, 1989 following Ramadan.
- A Cereal Disease and Insect Survey is also planned for Tunisia and Algeria.

6. Thesis Research

- ICARDA's support to Mr. M. Deghais Ph.D research will continue.
- A proposal for the support of Mrs. H. Amara from INAT for a Doctorat d'Etat was made as well as others for MSc. degrees at INAT in relevant subjects. It is requested that funds allocated to these thesis if accepted, be added to the current collaborative project's budget.

7. Impact Study

The drought conditions that prevailed last season prevented the conduct of the impact study of cereal crop improvement research on production in Tunisia. This study will be achieved coming season.

V. Budget

The operational budget allocated to the collaborative Cereal Improvement Project for 1988/89 will be the same as that of the 1987/88 season. In addition ICARDA will provide two single plant threshers as well as small seed treatment equipments and sprayers.

FOOD LEGUME IMPROVEMENT PROJECT

I. Participants

Mr. Habib Halila, INRAT
Mr. H. Ben Salah, INRAT
Mr. M. Laabidi, INRAT
Dr. M. Harrabi, INAT

Mr. A. Haddad, Office des Céréales
Mrs. F. Laaribi, Office des Céréales
Dr. M. Solh, ICARDA

Dr. A. Kamel attended part of the meeting.

II. Introduction

Mr. H. Halila welcomed all participants from national institutions and ICARDA. An overall view of the 1987/88 program was presented in the opening session. Results were discussed in details during the food legume group meeting. It was noticed that the implementation of the program has progressed satisfactorily and the field research program was fully executed at Beja and Oued Meliz but not at El Kef where the whole crop dried out this season because of the severe drought.

The active and significant contribution of INAT and Office des Céréales was acknowledged.

The 1987/88 was characterized by a severe drought, the most serious since a long time. The effective rainfall at the two main research stations where the program was conducted were 62% and 65% of the annual average rainfall at Beja and Oued Meliz, respectively.

Dr. M. Solh assured the national program full support.

III. Highlights of the 1987/88 Season

A. Breeding

1. Faba bean

- Compared to other crops the faba bean suffered most from the drought despite an irrigation at Beja of 20mm in April 88. In comparison to last year a 47% and 26% reduction in yield occurred at Beja and O. Meliz respectively.

- Many large and small seeded lines have exceeded the local check, but very few have done so significantly. These are: ILB 1821 and ILB 1814 at Beja, and ILB 1821, Palaelo, S 84097, S 84099, S 84103, S 84148, S 84156, Gemini and FLIP 83-106 FB at O. Meliz.

- More than three hundred F4 single plant selections (SPS) coming from crosses targetted to Tunisian conditions were selected under controlled pollination.

- Many selections from the local populations performed extremely well despite the adverse drought conditions.

- The determinate faba bean type failed completely this year.

2. Chickpea

- More lines have exceeded the local check at O. Meliz than at Beja, but only three have outyielded the local check significantly at both stations. These are: FLIP 84-164C, FLIP 84-155C and FLIP 85-86C.

- Compared to last year, 40% yield reduction was noticed at Beja while at O. Meliz only 14% reduction occurred. This is due to the 30mm irrigation given in April 1988 at O. Meliz. This shows that chickpea responds well to supplementary irrigation.

- The chickpea lines released to farmers performed well except for Chitoui (ILC 3279) which, being late, had suffered considerably from the drought at Beja but responded well to the supplementary irrigation of 30mm at O. Meliz (2229 kg/ha for O. Meliz and 1106 kg/ha for Beja).

- 40 F3 SPS, 144 F4 SPS and 23 F5 SPS were selected based on both their resistance to wilt and tolerance to Ascochyta.

- 233 F3 SPS coming from crosses made at ICARDA for Tunisia, were selected as resistant to wilt, in the wilt sick plot of Beja.

- 23 F6 bulks with resistance to both wilt and Ascochyta were selected for yield testing. Their seed size need, however, improvement.

3. Lentil

- A big number of lines exceeded the local check and many of them did it significantly at Beja and none of them at O. Meliz indicating that the local check is rather adapted to favorable rainfall conditions.

- The two lentil lines released for farmers in 1986 continued to perform well. On average Nsir (ILL 4400) and Nefza (ILL 4606) yielded 20% and 25% respectively more than the local check.

B. Pathology

- Apart from the wilt diseases which continue to cause considerable damage to chickpea specially in the area of Mateur, the season's conditions were not favorable for the development of other diseases. Sporadic Ascochyta rabiei occurred however at O. Meliz station.

- The problem encountered in creating artificial epiphytotics of Botrytis fabae was identified. The inoculum used was not issued from the "aggressive stage" culture.

- The pot technique to screen for reaction to fusarium and verticillium wilt separately was improved and further studies on fungal populations gave interesting results.

C. Training

- The training program scheduled was completed. Four technicians participated in a field experimentation course held at Morocco, one scientist spent one month in BNF training at Aleppo and one technician was trained for two weeks in breeding and agronomy at Aleppo.

- A highly successful course on hybridization techniques was organized in Tunisia with participation of a Moroccan technician.

IV. Work Plan for 1988/89 Season

A. Breeding

1. Faba bean

The breeding program will continue within the framework of the priorities identified as follows:

- high yield, adaptation and acceptable seed quality
- resistance to diseases.

1.1. Segregating Populations

- More emphasis will be on segregating populations and individual plant selections under local conditions. F5 seeds (20 seeds) will be advanced to F6 under controlled pollination. The remaining seeds from F4 single plant selections (SPS) will be yield tested as F5 progenies. Few seeds (5-10 seeds) from lines with sufficient seeds will be screened for resistance to botrytis and ascochyta at ICARDA-Lattakia site.

- Selections will be made within local populations (landraces)
- Segregating populations developed for Morocco for resistance to Orobanche will be attempted for screening in a farmer's field which was heavily and uniformly infested with Orobanche last season.

1.2. Yield Testing of Advanced Lines and Local Populations

- Preliminary, advanced and international yield trials and nurseries will be yield tested in appropriate research stations.

- Yield testing of homogeneous progeny lines selected from superior local populations (landraces) will start this season.

1.3. Crossing Block

- A crossing block will be established to combine high yield with resistance to botrytis, ascochyta, good seed and pod quality.

1.4. Germplasm Evaluation

- 200 ILB or BPL accessions from ICARDA will be evaluated for adaptation and expression of specific morphological and agronomic characters under local conditions. This is intended to be done on a yearly basis to evaluate the whole world germplasm collection. The same accessions will be proposed for simultaneous evaluation by the national programs in Algeria and Morocco to identify accessions with wide adaptation.

2. Chickpea

- The breeding program will continue to develop adapted cultivars with high and stable yield through breeding for:

- high yield and acceptable seed quality,
- resistance to ascochyta blight and wilt diseases.

The program will be putting more emphasis on seed quality particularly seed size.

2.1. Segregating Populations

- In order to combine resistance for both ascochyta blight and wilt diseases in one genotype, screening of populations segregating for resistance to both diseases will continue under artificial field inoculation using the shuttle method. Segregating generations from F2 to F6 will be included.

2.2. Yield Testing of Advanced Lines

- Preliminary, advanced and international yield trials and nurseries will continue to be conducted at appropriate research stations.

2.3. Crossing Block

- A crossing program will be implemented with the objective of combining high yield with resistance to both ascochyta blight and wilt as well as good seed quality. A crossing block will be established for this purpose.

- These crosses will be complemented by others at ICARDA when need be.

3. Lentil

Breeding will continue with the objective to identify improved cultivars with high and stable yield, good seed quality and mechanical harvesting characters. This will be through yield testing of breeding lines in preliminary, advanced and international trials in appropriate research stations.

B. Pathology

- Disease survey will be resumed in production areas in faba bean, chickpea and lentil if conditions are favorable for disease development.

- Work will be done to identify an effective screening methodology for resistance to Botrytis fabae under artificial conditions.

- Studies on the pathogenic variability of Ascochyta rabiei, Botrytis fabae and Ascochyta fabae will be initiated through the assignment of special topics to graduate students.

- Further studies will continue to develop an efficient and reliable laboratory technique for screening separately against Verticillium and Fusarium spp.

- Work will continue further on the variability of fungal populations of verticillium and fusarium obtained from Beja wilt sick plot. Studies will be attempted to compare the variability observed with that at other populations.

- ICARDA-Regional wilt resistant screening nursery will be strengthened with more resistant material from the Tunisian national program and that of Spain.

C. Agronomy

- Studies will continue on the identification of appropriate cultural practices for newly released varieties.

- Soil-core studies will be initiated to evaluate need-for-inoculation and isolation of native Rhizobium from farmers fields.

- On-farm trials and yield maximization plots will be organized by the Office des Céréales at selected off-station sites to evaluate the potential of newly released chickpea and lentil varieties as well as local faba bean populations.

- The Rhizobium studies will be conducted in collaboration with ICARDA and the remaining agronomy program will be executed within the Tunisia/IDRC project framework.

D. Proposed Training and Visits

1. Training

1.1. Short Courses

<u>Nature</u>	<u>Duration, Location & Date</u>	<u>Number</u>
- Insect Pests of Cereals & Food Legumes	2 weeks, Aleppo, April 1989	2
- Seed Production in Food Legumes	1-2 Weeks, Morocco, Early March	4-6
- Nitrogen Fixation and Inoculum Production	2 weeks, Morocco, March 20-30	2

1.2. Individual Training

<u>Nature</u>	<u>Duration, Location & Date</u>	<u>Number</u>
- Implementation of On-Farm Trials (FRMP)	2 weeks, Aleppo, Nov. 88	1
- Faba Bean Pathology (inoculation techniques)	2 weeks, Aleppo, Jan. 89	1
- Trial Management and Handling	2 weeks, Aleppo, March 89	2

2. Visits

2.1. National Scientists

- 4 national scientists to visit ICARDA during the season (mostly selection time).
- 2 national scientists to visit Nile Valley Project.
- Participation of one national scientist in seminar or workshop relevant to food legumes.

2.2. ICARDA Scientists

- Dr. M. Solh: when needed
- Dr. L. Robertson: early spring
- Dr. S. Hannounik: Botrytis inoculation (January)
- Dr. M.P. Haware: early spring
- Crossing Technique Technician: early spring (depends on flowering time).

E. Regional Travelling Workshop

A Regional Travelling Workshop will be organized in Algeria with emphasis on diseases.

FARMING SYSTEMS RESEARCH PROJECT

I Participants

The coordination meeting of the Farming Systems Project (FSP)-Goubellat took place at INRAT 13 and 14 September, 1988. The following list of participants shows the large number of institutions and individuals concerned:

Mme R.Khalidi	INRAT	Mr. H.Hizem	CES
Mme H.Amara	INAT	Mr. M.Achouri	CES
Dr. M.Djemali	INAT	Dr. J.Caddel	USAID-INAT
Dr. G.Khalidi	INRAT	Mr. A.Tounsi	Office des céréales
Mr. M.Kaabia	INRAT	Mr. M.Mejri	CTV.Goubellat
Mr. H.Mellouli	INRAT	Mr. H.Mettichi	CRDA-Béja
Mr. M.Mezni	INRAT	Mr. M.Essamet	INRAT
Mr. A.Gayadha	INRAT	Mr. Hadj Brahim	INRAT
Mr. S.Baccari	INRAT	Mr. H.Seklani	INRAT
Mr. L.El echi	INRAT	Dr. P.Cooper	ICARDA
Mr. H.Ghodbane	INRAT	Dr. A.E.Osman	ICARDA
Mr. A.Belhadj Tahar	INRAT	Dr. P.Beal	ICARDA
Mr. T.Soltani	INRAT	Dr. T.Stilwell	ICARDA
Mr. B.Djelassi	INAT		

II Introduction

The meeting started with a brief presentation of project history by Mrs. R. Khalidi, the national project coordinator. She emphasized that a two year extension was granted by IDRC starting with the 1987-88 agricultural year. The objectives during this extension are:

Test the most promising solutions researched during the first 4 years of the project. These include sheep flock management, Barley grazing, improvement of traditional fallow practices for sheep production, forage production and cereal production.

Continue the analyses and interpretation of survey data collected from 1984 through 1987. This work will provide information about the behavior and decisions of farmers in the region.

Determine the stability of selected dual purpose Barley varieties and decrease the degree of inbreeding within small sheep flocks. These will involve a few experiments in collaboration with farmers.

Evaluate technical practices from a socio-economic point of view and compare the new practices with traditional farmer practices.

III Principal Results of 1987-88

A 20 minute video presentation was shown to the group. It showed the 6 locations (3 on plain and 3 on hills) where the project is working. It also gave a brief resume of activities during the year including the experimental plot layout, crop growth, results of the drought and locust damage. It was followed by a brief presentation of results given by Mrs. R. Khaldi.

1. Climatic Conditions

Rainfall during the 1987-88 year was very poor. Recorded rainfall in Goubellat was an average of 249 mm compared with 615.2 mm received during 1986-87 and the 30 year mean of 414.4 mm. This was 60% less than 1986-87 and 40% less than the long term average.

2. Improvement of Cereal-Fallow Rotation

This theme concerns improvement of the cropping system of small farmers (less than 30 ha) using a cereal-fallow rotation. The agronomic research concentrated on the replacement of the traditional fallow by:

- a. improved fallow through scarifying and phosphate application.
- b. fallow planted to Medic.
- c. fallow cultivated on contour lines.

These alternatives will be compared with traditional fallow through their effects on:

- grain yields (Durum Wheat and dual purpose Barley)
- soil moisture balance (on slopes and plains)
- erosion, runoff and soil fertility
- sheep productivity

The area of each experiment is two hectares, one of which is reserved for the fallow treatments and the other for cereals (.5 ha for Durum wheat, .5 ha for Barley). The second year the fallow plots will be planted to cereals and the cereals plots will be in fallow.

2.1 Durum Wheat

The average yields of Karim were 37 Kg/ha grain and 925 Kg/ha straw. Because of the climatic conditions of the year all farmers pastured their wheat fields and no comparison could be made with farmer fields.

2.2 Dual Purpose Barley

Although usually not greatly affected by irregular rainfall, the dual purpose barley showed significant losses this year. As a result the plots were pastured at a late stage of vegetative growth. This contributed to greater forage production but lower grain yields. The comparisons made with regard to the local variety (a population of varieties) showed the following results:

- the rate of germination and tillers/square meter showed a highly significant difference compared to the farmers variety (120 versus 86 plants/m and 269 versus 123 tillers/m).
- the tillering capacity of Tej barley reached 7 to 8 tillers/plant compared to 2 tillers/plant for the farmers variety.
- within the protected subplots of 25 square meters the average yields of green and dry matter averaged 2745 kg/ha and 1711 kg/ha for the Tej and check respectively.
- grain yields varied from 433 kg/ha to 900 Kg/ha with a mean of 692 kg/ha.
- average straw yield was 1903 kg/ha with a maximum of 2200 kg/ha and a minimum of 1400 kg/ha.

2.3 Comparison between traditional fallow, fertilized fallow and fallow planted to Medic

This comparison was made taking into account the density of the vegetation, the vegetative covering, pasturing, and yields in dry matter.

- a. Effect of the treatments on the density of the vegetation.
- There was no significant difference between the check fallow and the fertilized fallow.
 - The Medic treatment showed the highest plant density compared to the other two treatments (highly significant).
 - The natural flora was very poor in legume content.
 - There was no significant difference between treatments 1 and 2 for the density of legumes.
 - The density of the Medic planting was heterogeneous and 35% below the expected level.

- The classes of other families present showed variability in their forage importance due to the presence of non-palatable species in some locations.
- The number of weeds was significantly lower in the Medic plots.

b. The percent ground cover was 12 times higher in the medic plots.

c. Effect of grazing on ground cover

Because of the climatic conditions of the year plot grazing started 3 months later than normal. The beginning of the grazing coincided with flowering of the medics and was disastrous for seed set and consequent natural regeneration of the medic.

d. Treatment effect on dry matter production

Total dry matter production on all farmer fields was extremely low, being less than 1 T/ha.

2.4 Effect of the cropping systems on water balance and water use efficiency.

This program of research, in relation to the preceding ones, included measurements of rainfall, runoff and soil humidity. Given the difficult conditions of the year the experiments showed:

- a stunted vegetative growth and poor plant density with a bluish green color indicating significant water stress.
- a water reserve from the preceding agricultural year starting at 40-50 cm depth which was not exploited by crops due to their superficial root system (0-30 cm).

2.5 Impact of cropping system on erosion, runoff and soil fertility.

For the objectives of the soil and water conservation study equipment was installed to collect eroded soil and runoff water in plots of cereals and fallow. These studies showed:

- small quantities of erosion and runoff under the different vegetative covers (treatments).
- soil erosion on the check fallow was higher than the other vegetative covers being 227.5 Kg/ha for check fallow compared with 82 Kg/ha for Barley, 62 Kg/ha for Wheat and 52 Kg/ha for the Medic.

- Soil losses on the fertilized fallow and fallow under contour discing were slightly lower than under the check fallow (56.5 Kg/ha compared to 227.5 Kg/ha on an 11% slope).

2.6 Effect of the fallow treatments and dual purpose barley on sheep productivity.

The animal science research is based on the study of the effects of different fallow alternatives and dual purpose Barley on sheep production.

For this study the flocks of the six farmers pastured the improved fallow and dual purpose Barley to permit determination of the number of days of grazing possible on each treatment. Preliminary results of this experiment showed that the medic plot and the fertilized fallow gave enough grazing to satisfy the flocks at a minimal level. These plots tended to offer a greater number of grazing days.

In addition the follow-up of flocks included notes on feeding of ammonia treated straw, feeding of concentrate, prophylactic sanitary measures and the introduction of improved rams. These subjects compose the basic lines of animal science research in the project.

3. Analysis and interpretation of the survey data

As planned in the objectives for the 2 year extension, this year's agro-economic research has focused on the analysis and interpretation of survey data obtained from 1984 through 1987 on a representative sample of 45 farms in Goubellat.

One of the uses of these data is a study of the costs of production of cereals. The objectives of this study include:

- Determine the real structure of costs of production of the principal cereal crops (Durum wheat, Bread Wheat and Barley)
- Evaluate these costs for each group of farmers identified.
- Compare these costs to yields, i.e. calculate the net profit per hectare.
- Evaluate the change of production costs in relation to climatic risks, and the changes in costs of inputs.

The results presented were based on Durum Wheat grown by 87% of the farmers during the crop year 1986- 87. The following points were discussed:

- eight systems of cultivation were identified in the zone. The most complete system, i.e. the system which had all the recommended cultural operations from plowing up to harvest, was followed by only 56% of the farmers.
- Soil preparation is the most costly operation. It represents about 30% of the total costs followed by harvest (20% of total costs) and planting (15% of total costs).
- The average cost of production of Durum Wheat for the first system of cultivation was 108.500 TD/ha (calculated costs). For the other systems of cultivation which have fewer operations the cost was less than this value.
- Generally speaking the average costs per quintal of Durum Wheat was about 5.250 TD. This permitted a net profit of about 13.250 TD.
- Considering all farmer groups the mechanized farmers with 30 ha or more and the farmers with less than 30 ha without a tractor but with sheep and off-farm activity showed the highest profits and the lowest costs per quintal.

During the afternoon session detailed results were presented by the researcher responsible for each program. These presentations were followed by interesting discussions between the project researchers and other participants in the meeting.

IV Research Programs Planned for the 1988-89 Crop Year

The second day of the coordination meeting was devoted to presentations of research programs for the 1988-89 agricultural year. The presentations and discussions that followed all concerned the project extension or rather its second phase.

1. Program of research for 1988-89

The program for the next year is a continuation of the experiments undertaken during the preceding year. During the second year the plots that were sown to wheat or barley will be placed under different fallow treatments. Wheat and barley will be sown on the plots of the different fallow treatments. The basic objectives of the program remains the same. These are to resolve the imbalance between sheep-forage-cereal production.

1.1 Research on Cereals and forages

For Durum Wheat efforts will be concentrated on:

- evaluation of the vegetative development and grain yields in relation to the preceding fallow treatments.
- study of soil homogeneity.

Concerning the program for dual purpose Barley the previously described objectives were maintained. They are:

- evaluation of forage, grain and straw production by dual purpose Barley.
- evaluation of grazing days possible on dual purpose barley and a comparison with grazing days possible on the fallow alternatives.
- evaluation of the forage value of barley compared to the fallow alternatives.
- An economic evaluation to permit calculation of costs of production and net profit for dual purpose barley. This will also include a comparison between the dual purpose variety and the local farmer variety (population of varieties).

For the improved fallow, the same data will be taken as last year, being:

- vegetation density
- percentage of soil coverage
- production of green and dry matter

It was decided to use a variety of medic having a smooth seed coat to replace the spiny seeded medic. This was to avoid contamination of sheep wool. Classification of weed species will be done according to their palatability. The Nitrogen status of the soil will be determined at the start and end of each treatment cycle.

1.2 Animal Science research

Within the multidisciplinary approach of the project the animal science research is composed of three levels. The first level is directly related to the experimental plan previously described. This work consists of:

- measuring the number of days or hours of grazing on Barley and the different fallow treatments.

- determination of the palatable species

The second level consists of continuing the work of:

- identification of newborn lambs.
- weighing the different types of sheep
- evaluation of the effect of improved rams.

The last level relates to increasing the awareness of the farmers about the importance of using mangers, feeding of concentrate and veterinary care for their flocks.

1.3 Study of the effect of rotation on soil water balance

The aim of this study is to measure the water use efficiency of the crops in relation to the preceding crop. Therefore the experiment undertaken on each plot located on a slope will be carried out using the same methodology as during the first year.

The profiles will be followed on all plots and throughout the year with the goal of analyzing the depletion of water reserves in the soil. In addition the researcher associated with this program will undertake a study of the water balance and water use efficiency differences between the local populations and varieties of wheat and barley tested by the project.

1.4 Soil and Water Conservation

The same experimental equipment used last year will be installed this year on the fallow plots as well as plots of Durum Wheat and Barley. These are installed on selected rotations (fallow-cereal and medic-cereal) with the objective of studying erosion, runoff and fertility losses as well as the impact of contour cultivation on production.

Physical and chemical analyses (OM, N, P,K) will be performed on the collected sediments. The yields of Durum Wheat, Barley and the fallow treatments will also be done.

1.5 Socio-Economic Research

The socio-economic research related to three main points:

- a. completion of the analysis and interpretation of the survey data collected during the three cropping years 1984-85, 1985-86 and 1986-87. To date the statistical analysis has involved only the data from the first year and selected data from other years.

Documents similar to those prepared for the 1984-85 analyses will be compiled for the other years. This will provide a basic data set for all the research disciplines involved in the project. It will provide valuable information on the choice of the production techniques, their evolution and the reasons given for the way things are done. It also permits undertaking studies such as the cost of production study done this year. The themes of study will be identified in collaboration with the other researchers involved in the project.

b. Socio-economic evaluation of recommended practices
(Dual Purpose Barley and improved fallow)

This evaluation will allow us to compare the costs of production of improved techniques compared to the techniques used by the farmers. They will also allow us to compare the net profit or gains resulting from various practices. This evaluation will eventually lead to a study of the impact of improved production practices.

c. Formation and implementation of a methodology to approach Tunisian agricultural development in the semi-arid zone

In addition to the promising results which we expect to extend to farmers and the studies completed within the project, we think it is also important to work up an approach in terms of FSR to be adapted to semi-arid regions in Tunisia. A more constructive dialog is necessary between the different disciplines associated with the project concerning the information and thoughts collected at the level of the selected farmers. Such a dialog will actually be put into concrete form via a study based on our experience in the field of research on systems of production and will constitute our working document for the seminar proposed by Mr. M. Boujbel. This seminar will involve the participation of the 3 research projects on Systems of Production (ICARDA-IDRC, USAID project and SAD-France project).

1.6 Miscellaneous Activities

The project team members thought it would also be useful to organize training sessions on the software available to the project in order to better use statistical tools that are essential to all disciplines, and to benefit from Dr. Stilwell's experience in this field before his departure.

1.7 Possibilities for project extension (second phase)

The last, but not least, important issue to be discussed related to the possibilities of extending the project. This is desired by all team members and encouraged by Dr. P. Cooper who kindly submitted his ideas and experience. He made it clear that the scientific and technical assistance of ICARDA will be maintained irrespective of the terms of the IDRC agreement.

Preliminary discussions between the team members pointed to two goals which are essential for the second phase of the project and which relate to the theme of research-extension.

- The first goal will be to continue the experiments in progress since they concern a rotation. These experiments will be valid only if they are repeated a minimum number of years.
- the second goal will be the extension and dissemination of the research results. This may include improved management of sheep, use of dual purpose barley and its impact on sloping lands and simple anti-erosion techniques (rotation, cultivation on contour, strip contour farming, etc.)

The proposal for a second phase of the project will be drafted in the next few weeks and sent to IDRC in sufficient time.

Project participants and their fields of research:

Mme R.Khaldi	Project Coordinator	
	Agro-economist	INRAT
Dr. T.Stilwell	Agronomist	ICARDA
Mme H.Amara	Agronomist	INAT
Dr. H.Djemali	Animal Scientist	INAT
Mr. H.Kaabia	Agronomist	INRAT
Mr. H.Mellouli	Bioclimatologist	INRAT
Mr. M.Mezni	Forage Agronomist	INRAT

Closing Session

Subsequent to the presentations of the three national project coordinators; a summary of which is shown in the preceding pages, following discussion took place.

Dr. M. Lasram requested the national food legume group to develop a brochure for the newly released chickpea and lentil varieties for distribution to farmers. This brochure should be similar to the one previously developed for the release of the new barley varieties in 1985 and include the agronomic practices developed, i.e. sowing date, seed rate, weed control etc.

He indicated that the new INRAT/IDRC project on food legumes covers essentially the transfer of the agronomic packages developed to farmers. This however does not cover all aspects of agronomic/physiologic research on food legumes. The research on biological nitrogen fixation supported by ICARDA is an important aspect that need to be strengthened.

He urged the farming system's project team to enquire on the procedure and the time required for developing a second phase for the project. This he said is a long procedure and needs to be started as soon as possible to ensure the continuity of the work.

Dr. Lasram indicated that it would be very useful and necessary to organize training sessions in Tunisia for researchers on the software available in order to better use statistical tools that are essential to all disciplines and to benefit from Dr. Stilwell's experience in this field before his departure.

He added that a constructive dialog is necessary between the different disciplines associated with the farming systems project concerning the information and thoughts collected at the level of the selected farmers. Such a dialog will actually be put into concrete form via a study based on the experience of the project group in the field of research on systems of production. This will constitute a working document for the seminar proposed involving the participation of the three research projects on production systems.

He stressed the importance of conducting the impact study this coming season. This he said was to be conducted last year but the adverse climatic conditions did not allow. He added that the Ministry of Agriculture is supportive to this study that will measure the role of the research on cereal improvement on cereal production in Tunisia.

He wishes the PDP 11 computer problem be solved as soon as possible to allow the use of this powerful and sophisticated machine.

He finally said that ICARDA should think of a more practical way for conducting the coordination meetings in the various countries. Currently it is a series of meetings in different countries and majority if not all are during the period of September and October prior to planting. This makes the participation of the program leaders or ICARDA management in all of these very difficult. He mentioned that we should think of different periods for these meetings, regional rather than country by country meetings, or other formats.

Dr. P. Cooper assured Dr. Lasram that ICARDA Farm Resource Management Program will support the farming systems project in Tunisia in all possible ways, whether there is a second phase for the project to be sponsored by IDRC or not. But the initiative should start from the national group of researchers who should identify exactly what they plan to do.

In a reply to Dr. Lasram's comment on a suitable format for coming coordination meetings, Dr. A. Kamel said that as a result of the increased number of meetings and with majority if not all falling within the period of September and early October, ICARDA is seriously thinking of finding a better and more feasible format. ICARDA has various thoughts but would like to share these ideas with the national counterparts to come up with a practical and efficient format. Some of these ideas are to hold some of the meetings during the crop season to coincide with the visits of ICARDA staff to these countries, others to schedule a small coordination meeting for each country during the season and a regional coordination meeting for countries of this region at a different date. Other formats are also possible and we should think together to come up with an agreeable format that would not impose on the time and effort of ICARDA senior staff nor on the national teams.

Dr. Kamel said that the presentations of the three projects focussed essentially on the activities at the national level in Tunisia but various other activities of a regional; Maghreb countries perspective need to be mentioned. Examples of these are the Regional In-Country Course on Experimentation and Extension conducted at ENA, Meknes in which 5 Tunisians attended, the In-Country Training Course on Crossing Techniques for Food Legumes held at Beja, Tunis in which a Moroccan technician participated, the In-Country Training Course on Methods of Farm Surveys conducted in Tunis that was attended by 3 Algerians, 1 Moroccan in addition to 7 Tunisians. In cereals a survey for Hessian Fly was conducted in Tunisia and Morocco by Moroccan and ICARDA researchers, a cereal disease survey was conducted in Morocco by Moroccan, Tunisian and ICARDA scientists and a Cereal Travelling Workshop was organized in Morocco with participants from INRAT, INAT and ESAK from Tunisia, INRA, IAV and ENA Meknes. This gives examples of ICARDA current regional role in bringing together various countries in the region and also various institutes within each country.

Moreover an International Workshop on the Role of Legumes in the Farming Systems of Mediterranean Areas was organized in Tunisia in which thirty participants from 17 countries attended.

He added that as for the training and support of Tunisian researchers to attend scientific workshops and seminars, from last coordination meeting in September 1987 to date the total of 42 Tunisians attended training courses in ICARDA, Aleppo or ICARDA organized in-country training courses in the Maghreb countries. In addition ICARDA sponsored professional visits of 31 Tunisian researchers.

Moreover ICARDA is in the process of identifying the appropriate way to support a Ministry of Agriculture/FAO/UNDP project on Supplementary Irrigation for Cereals as well as a forage component of the Livestock Development Project in southern Tunisia.

In conclusion Dr. Kamel said that ICARDA's association and collaboration with Tunisia was as usual very rewarding. He gave tribute to the scientists of these projects and wished them a good season to come.

Dr. Lasram thanked Dr. Kamel for his statement and concluded by thanking all participants to this meeting.

By this the closing session came to an end.

SIXTH TUNISIA/ICARDA COORDINATION MEETING

SEPTEMBER 13 - 14, 1988

Tuesday, September 13

09.00 - 09.30	Opening Session
09.30 - 12.30	Highlights of the Projects
	Concurrent Sessions
14.00 - 18.00	Review of 1987/88 Research Results
	- Cereals
	- Food Legumes
	- Farming Systems

Wednesday, September 14

09.00 - 12.30	Research Plans for 1988/89 Crop Season
14.00 - 17.00	Research Plans for 1988/89 Crop Season (Cont.)
17.00 - 18.00	Presentation Summary of 1987 Results and 1988 Work Plans
	Closing Session

Participants to the Sixth Tunisia/ICARDACoordination MeetingSeptember 13-14, 1988

Dr. M. Boujebel	Ministry of Agriculture
Mrs. F. Larbi	Ministry of Agriculture
Dr. M. Lasram	INRAT
Mr. T. Tnani	INRAT
Mr. A. Maamouri	INRAT
Mr. M. Deghais	INRAT
Mr. M. El Felah	INRAT
Mr. M.S. El Gharbi	INRAT
Dr. M. Ben Salem	INRAT
Mr. M. Mosbahi	INRAT
Mr. H. Halila	INRAT
Mr. H. Ben Salah	INRAT
Mr. M. Laabidi	INRAT
Mr. M. Essamet	INRAT
Mr. Hadj Brahim	INRAT
Mrs. R. Khaldi	INRAT
Dr. G. Khaldi	INRAT
Mr. M. Kaabia	INRAT
Mr. H. Mellouli	INRAT
Mr. M. Mezni	INRAT
Mr. H. Ghodbane	INRAT
Mr. A. Belhadj Tahar	INRAT
Mr. T. Soltani	INRAT
Mr. H. Seklani	INRAT
Mr. A. Ghayadha	INRAT
Mr. S. Baccari	INRAT
Mr. L. El Echi	INRAT
Dr. A. Daaloul	INAT
Dr. M. Harrabi	INAT
Dr. M. Djemali	INAT
Mrs. H. Amara	INAT
Mr. B. Djelassi	INAT
Mr. A. Salami	Office des Céréales
Mr. L. Tounsi	Office des Céréales
Mr. A. Haddad	Office des Céréales
Mrs. F. Laribi	Office des Céréales
Mr. M. Mejri	CTV/Goubellat
Mr. H. Mettichi	CRDA/Beja
Mr. H. Hizem	CES
Mr. M. Achouri	CES
Dr. J. Caddel	USAID-MIAC-INAT
Mr. R. Sayoud	ITGC/Guelma, Algeria
Dr. M. Nachit	ICARDA/Syria
Dr. P. Cooper	ICARDA/Syria
Dr. A.E. Osman	ICARDA/Syria
Dr. M.S. Mekni	ICARDA/Morocco
Dr. M. Solh	ICARDA/Morocco
Dr. P. Beal	ICARDA/Morocco
Dr. T. Stilwell	ICARDA/Tunisia
Dr. A. H. Kamel	ICARDA/Tunisia