

ACIAR CIM/2004/024

**Better crop germplasm and management for improved
production of wheat, barley and pulse and forage
legumes in Iraq**

Iraq-ICARDA-Australia

1 May 2005 – 30 June 2008

- **Background, implementation and achievements**
 - **May 2005- December 2006**

Proposal finalisation

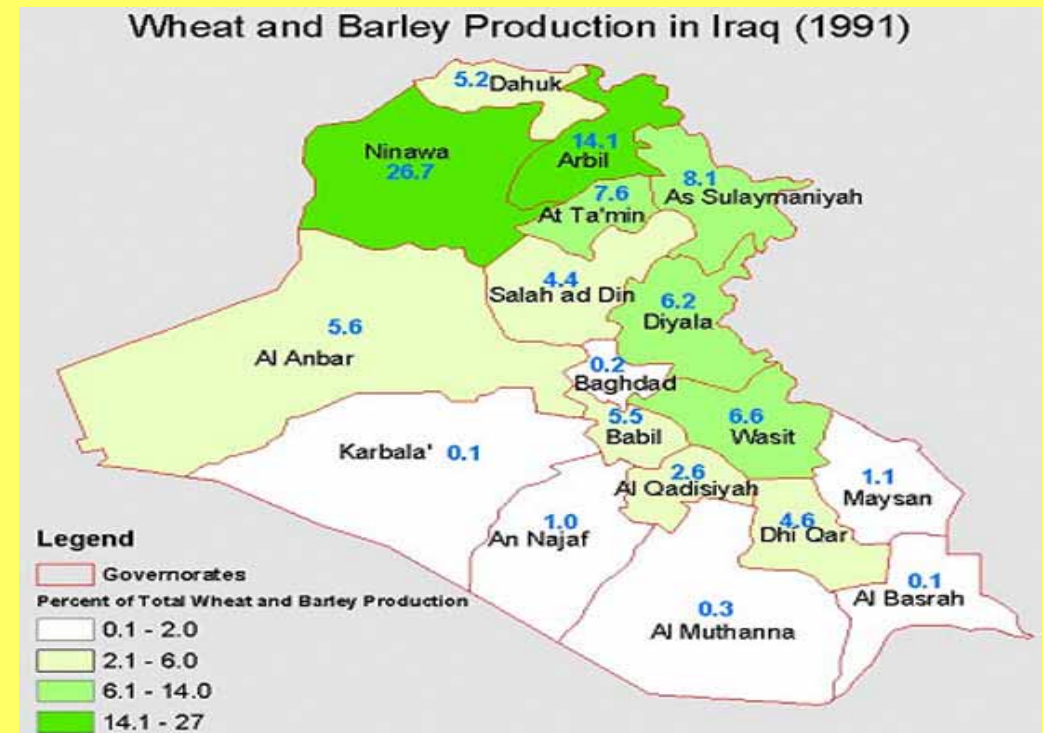
Planning meeting at ICARDA in Nov 04 to finalize the proposal with:

- ACIAR
- ICARDA
- MOA Iraq
- Australian partners (AgWA, CLIMA UniWA, UniAdelaide)



Focus

- rainfed cropping
- Ninevah Governorate
- crops
 - wheat, barley, chickpea, lentil, vetch, forages
- crop and soil management
 - establishment (zero tillage), fertilisers, crop protection, weed control, rotations (canola)



Objectives



Aim: To improve dryland cropping in northern Iraq through the testing, promotion and dissemination of improved crop cultivars and crop management practices.

Objectives:

- **Demonstration and promotion of “best bet” varieties and crop management technologies:**
 - To **identify, promote and widely disseminate** amongst farmers in the rainfed cropping regions of northern Iraq “best-bet” **improved varieties and crop management systems** for wheat, barley and pulse and forage legumes.
- **Germplasm adaptation research:**
 - To introduce, **evaluate and select improved germplasm** of wheat, barley and pulse and forage legumes for adaptation to rainfed farming systems in northern Iraq.
- **Crop management research:**
 - To identify, **evaluate and select improved cropping system management** options suited to rainfed farming systems in northern Iraq.
- **Capacity strengthening**
 - To enhance the **capacity** of Iraqi research and extension program to identify and evaluate potentially valuable germplasm and better crop/soil management technologies and promote their adoption by farmers

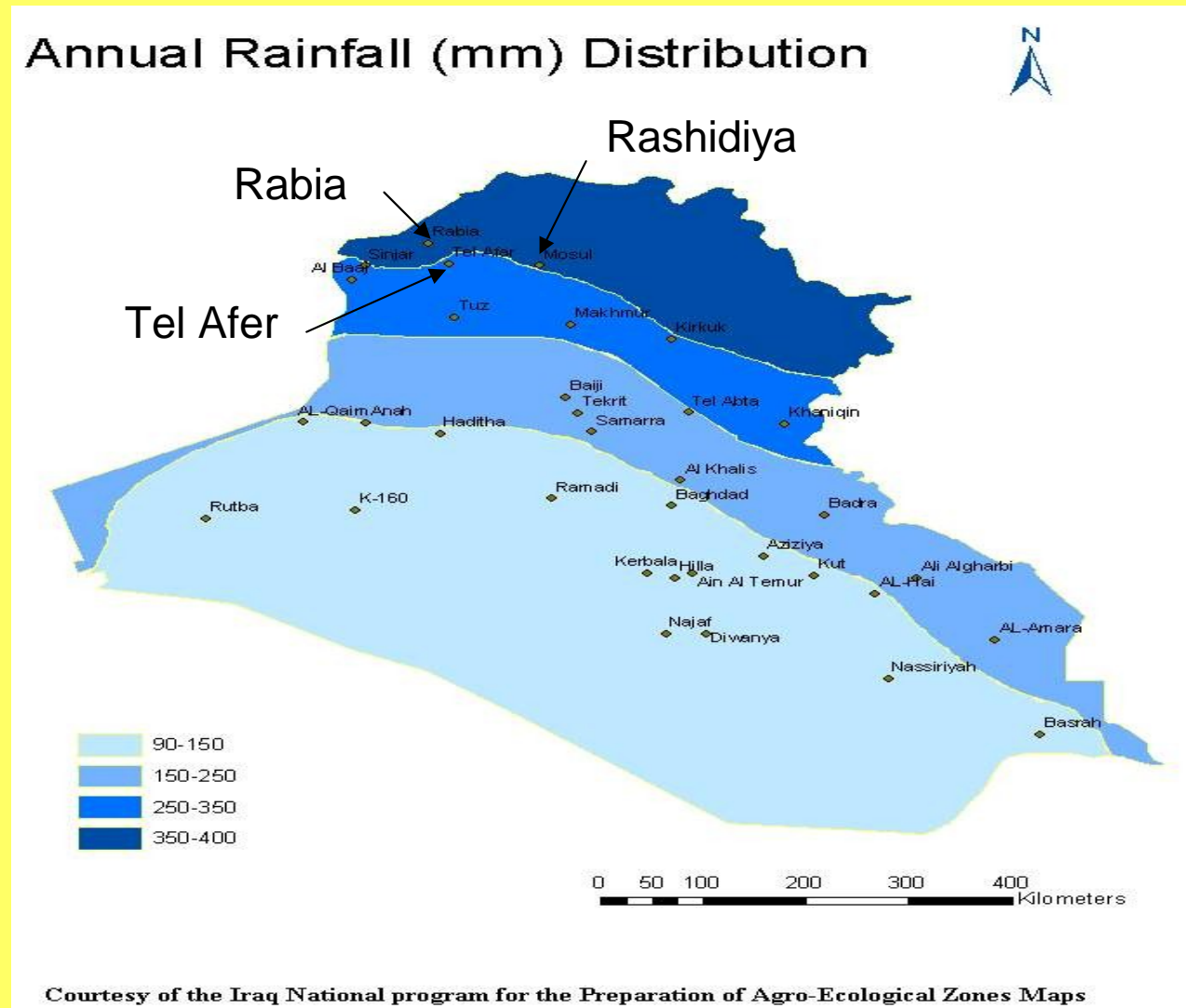
- partners
 - MOA/DOA Iraq
 - University of Mosul
 - ICARDA
 - Australia: AgWA, CLIMA UniWA, UniAdelaide
- time frame and budget
 - 3 years (May 2005 – June 08)
 - A\$1.2 million
- agreements signed by:
 - ACIAR and ICARDA (April 2005)
 - ICARDA and MOA (July 2005)

Ninevah targets

Three main agro-climatic zones

- high rainfall areas (HRA) >450mm
 - Rabia Research Station
- moderate rainfall areas (MRA) 350-450mm
 - Rashidiya Research Station
 - Tel Afer Research Station
- low-rainfall areas (LRA) <200-350mm)

Location



Activities (baseline information, demonstrations)

Objective1 To identify, promote and widely disseminate amongst farmers in the rainfed cropping regions of northern Iraq “best-bet” improved varieties and crop management systems for wheat, barley and pulse and forage legumes

1. Compile and review current available information on farmers’ practices and production and economic / marketing constraints
2. Baseline survey and analysis of production constraints/limitations in individual agro-climatic zones (survey team to be identified from Iraq)
3. Compile, review and analyse existing information on potential available technology options, i.e., options already tested in Iraq, including registered Iraqi varieties of target crops and crop management options
4. Round table discussion between project partners and representative farmers from the three agro-climatic zones to review options and decide best-bet technologies to be promoted in each zone
5. First Annual Project Planning meeting of all project partners (immediately following round table discussion)
6. Based on work plan, select sites and participating host farmers and farmer groups for on-farm demonstrations. 3-5 demonstrations in each agro-climatic zones (10-15 demonstrations total)
7. Implement on-farm demonstrations
8. Monitor demonstrations and jointly evaluate options with farmer groups to identify preferences and/or potential constraints to adoption.
9. Field days for farmers and development of extension material to disseminate information on new options
10. Annual project review and planning meetings to review results of previous year and agree work plan for coming year
11. **Assess potential adoption and impact of technologies based on information from baseline surveys and results from demonstrations**

[3.3a Flow chart pp. 22-25]



Activities (germplasm adaptation research)

Objective 2. To introduce, evaluate and select improved germplasm of wheat, barley and pulse and forage legumes for adaptation to rainfed farming systems in northern Iraq

1. Identify potential lines from Iraq, ICARDA's international nurseries, Australia, and other sources
2. First Annual Project Planning meeting of all project partners
3. Introduce and evaluate improved lines in the three research stations (one in each agro-climatic zone). Jointly evaluate lines with farmer groups
4. Annual project review and planning meeting to review results of 1st years evaluation and agree work plan for 2nd cropping season
5. Selected entries from Yr 1 will be evaluated in the research stations (3 trials) and in replicated trials on farmers' fields in 3 sites in each agroclimatic zone (3x3 = 9 trials). Jointly evaluate cultivars with farmer groups
6. Annual project review and planning meeting to review results of 2nd year's evaluation and agree work plan for 3rd cropping season
7. Selected entries from Yr 2 will be evaluated in the research stations (3 trials) and in replicated trials on farmers' fields in 3 sites in each agroclimatic zone (3x3 = 9 trials). Jointly evaluate cultivars with farmer groups
8. Identify promising lines for registration and release
9. Develop capacity at Rabia station to produce seed for research and demonstrations



Activities (crop management research)



Objective 3. To identify, evaluate and select improved cropping system management options suited to rainfed farming systems in northern Iraq

- 1. Based on collective knowledge, identify and prioritize those constraints/limitations in crop production systems which need further research to identify improved crop and soil management practices (potential research areas already identified with Iraqi partners are: tillage and sowing systems, pest and weed management, and new crop rotation options)**
- 2. First Annual Project Planning meeting of all project partners**
- 3. On-station research on crop management options to fill gaps in information. Joint evaluation of options with farmer groups**
- 4. Annual project review and planning meeting to review results of 1st year and agree work plan for 2nd year**
- 5. Based on 1st year's results implement on-station and farmer-managed on-farm (3 sites in each agro-climatic zone) research trials of potential options Joint evaluation of options with farmer groups. Identify potential constraints to adoption**
- 6. Annual project review and planning meeting to review results of 2nd year and agree work plan for 3rd year**
- 7. Based on 2nd year's results implement on-station and farmer-managed on-farm (3 sites in each agro-climatic zone) research trials of potential options Joint evaluation of options with farmer groups. Identify potential constraints to adoption**
- 8. Identify options for introduction into promotion and dissemination program under Objective 1**

Activities (capacity enhancement)

Objective 4. To enhance the capacity of Iraqi research and extension program to identify and evaluate potentially valuable germplasm and better crop/soil management technologies and promote their adoption by farmers

- 1. Annual Project Meetings: Develop program of training including on-the-job coaching, short term courses, workshops, individual visits to ICARDA and/or Australian partners, and selective longer term activities. MOA to nominate suitable staff for training**
- 2. Short-term training courses in germplasm evaluation, cropping systems management, seed production & seed quality control, integrated pest/disease/weed management, and extension methods (5 x 4 trainees = 20 Iraqi staff per year)**
- 3. Individual training for MOA staff in economic analysis, adoption and impact assessment (2 persons)**
- 4. Senior Iraqi scientists (one per year) visit one Australian research institute (6-8 weeks)**
- 5. Support participation of Iraqi personnel in regional or international workshops and conferences of relevance to the project**

Project inception planning meeting

ICARDA 11-14 July 2005



Project inception planning meeting

ICARDA 11-14 July 2005



Inception meeting outcomes

- **preparatory activities initiated**
 - baseline surveys
 - seed preparation
 - identify sites and personnel in Iraq
- **preliminary workplan for legume, cereal and crop management research and demonstrations drafted**

Project planning meeting

ICARDA 4-8 September 2005



Planning meeting outputs

- reviewed July-Sept 05 baseline survey of 260 farmers
- agreed on 2005/06 workplan compatible with:
 - objectives, outputs (Table 3.2), activities (3.3a Flow chart), budget
 - resources and prevailing situation in Iraq
- agreed on strategy and responsible scientists to implement workplan
- exchanged information/experiences through three seminars by Australian collaborators on relevant crop-livestock systems in Iraq/Australia

Project reporting (05-06) and planning (06/07) meeting

ICARDA 1-5 October 2006



Reporting/planning meeting outputs

- for research and demonstrations on legumes, cereals, agronomy and the baseline survey:
 - reported 2005/06 activities and results
 - developed 2006/07 workplans
- reviewed 2005/06 progress and 2006/07 plans for:
 - training
 - capital items
 - finance
 - seed requirements
 - Iraq cropping review
- exchanged information and experiences through four seminars by Australian collaborators on relevant crop-livestock systems in Iraq/Australia

Achievements May 2005-June 06

- **2005/06 workplan was developed at meetings at ICARDA in June, July and September 2005 with ICARDA, Iraqi and Australian scientists. Required seed (16t) was supplied in October 2005**
- **major baseline survey of 260 farm families undertaken in July-Sept 05 by University of Mosul, MOA Baghdad and ICARDA socio-economists**
- **Ninevah Implementation Committee, set up by MOA to manage the project, met and produced minutes from 18 meetings which discussed and coordinated Iraqi activity**
- **demonstration program implemented in 12 locations covering HRA, MRA, LRA and SI**
- **in the ambitious research program, 27 of the 80 planned research trials evaluating better adapted lines/varieties were conducted**
- **the agreed training program was exceeded with 26 Iraqis participating in 6 training courses**
- **capital purchase of 4 zero-till seeders was completed and of seed cleaning plants is under way**
- **operational funds transferred to all partners**



Tel Abta (LRA) 2005/06



Baashiqa (MRA) 2005/06



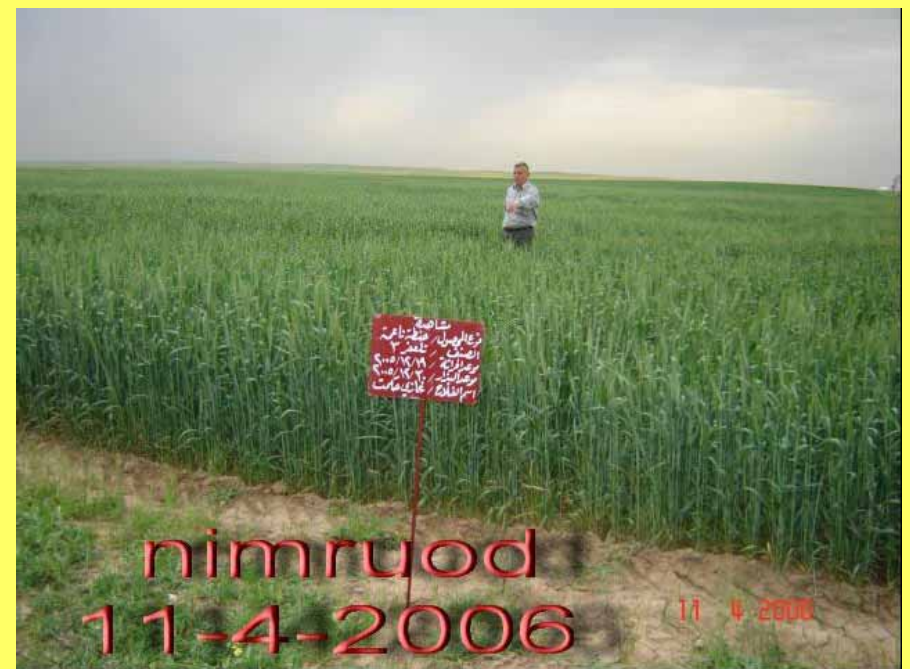
Bekia Var IPA 2001 harvest
23 May 06



Al Shikhan (HRA) 2005/06



Al Nimrud (SI) 2005/06



Demonstration summary



Highest grain/forage yields from the different rainfall areas/locations were:

LRA

- **barley – Zanbaka**
- **forages – Vicia sativa IPA 2001 at Hatra, V. narbonensis cv. Velox in Mahalabia, V. dasycarpa cv. Couhak in Tel Abta**

MRA

- **barley - Rihane 3**
- **bread wheat - Cham 6**
- **durum wheat – Karonia**
- **chickpea – Ghab 4**
- **lentil – IPA98 in Bashiq/Tel Kief, Baraka in Hamdaniya**
- **forages – V. sativa IPA 2001 in Bashiq, Lathyrus sativus 587 in Tel Kief**

HRA

- **bread wheat - Cham 6 in Al Shikhan, Cham 4 in Al Koush, Abo Ghraib 3 in Rabia**
- **durum wheat – Karonia**
- **chickpea – IPA510 in Al Kosh, Ghab 4 in Al Shikan**

SI

- **bread wheat - Tel Affer 3 , Cham 6**
- **durum wheat - Om Rabia 5 , Cham 3**

Demonstrations

Findings and achievements:

- **improved crop varieties yielded higher than local varieties**
- **improved crop management yielded higher than farmer management**
- **field visits/days held on each site**
- **farmers keen to adopt some cultivars of wheat and barley**
- **forage mixtures were well adapted and productive under the MRA, where farmers were very keen on adoption**
- **project had a good image with farmers in the province**
- **press and media coverage was high to inform farmers**

Research 2005/06



Ten planned sites: **LRA** (Al Namroud, Bartala, Al Hadar, Tel Abta), **MRA** (Al Rashidiya, Tel Keif, Tel Afar, Baashiqa), **HRA** (Rabeea, Al Koush)

Researcher management with extension and farmer participation in technology evaluation

Progress:

- **Bread wheat:** 4 of 14 planned nurseries conducted in Al Rashidiya Research Station (RS)
- **Durum wheat:** 2 of 4 planned nurseries conducted in Al Rashidiya RS
- **Barley:** 5 of 17 planned nurseries conducted in Al Rashidiya RS
- **Chickpea:** 13 of 16 planned nurseries conducted at Al Rashidiya, Alkosh
- **Lentil:** 2 of 8 planned nurseries conducted in Al Rashidiya RS
- **Faba bean:** 1 of 9 planned nurseries conducted in Al Rashidiya RS
- **Forages:** 5 vetch, 2 oat, 2 lathyrus nurseries not conducted
- Total** 27 of 80 planned nurseries conducted

Heavy rain, security concerns, land disputes, transport shortages, experimental design misunderstandings meant 53 of 80 planned trials not planted (postponed to 2006/07)

Cereal nurseries

Barley

- **International Barley Segregating Populations – Spring Types**
- **International Barley Segregating Populations - Winter Types**
 - 9 selected out of 146 populations as bulk
- **Barley Nursery for Iraq – Moderate Rainfall Areas**
 - 32 selected out of 100 lines
- **Barley Nursery for Iraq – Low Rainfall Areas**
 - 46 selected out of 100 lines

Bread wheat

- **CWANA First Dry land Spring Bread Wheat Screening Nursery 2005-06**
 - 30 selected out of 81lines
- **Australian – Iraqi Wheat trial**
 - 11 selected out of 29 lines

Durum wheat

- **International Durum Segregating Populations-Mediterranean Dry land**
 - 15 selected out of 45 populations
- **International Durum Yield Trial for Dryland Temperate Areas**
 - 6 selected out of 24 lines

Legume nurseries



Chickpea

- **Chickpea International F4 Nursery-Mediterranean Region 2006**
 - 15 populations out of 30
- **Chickpea International Nursery for Drought Tolerance 2006**
 - results available
- **Chickpea International Nursery for Fusarium wilt-2006**
 - 38 lines selected out of 61
- **Chickpea International Nursery for Cold Tolerance-2006**
 - 20 selected lines out of 41
- **Chickpea International Nursery for Ascochyta Blight-2006**
 - 27 lines selected out of 41
- **Chickpea International Elite Nursery-Spring-2006 1 & 2**
 - 28 & 19 lines selected out of 49

Lentil

- **Lentil International F3 Nursery-Large Seed-2006**
 - 7 populations using 5-10 individual plant selection
- **Lentil International Elite Nursery-Small Seed-2006**
 - 17 lines selected out of 64
- **Lentil International Drought Tolerance Nursery 2006**
 - 17 lines selected out of ?
- **Lentil International Elite Nursery-Large Seeds-2006**
 - 10 selected out of 25

Faba bean

- **Faba Bean International Improved S1 Populations Nursery 2006**
 - 8 selected out of 8

Training



ICARDA-based training

23 places available for short-term training at ICARDA each year

2005/06

26 trainees attended 6 courses in 2005/06:

- 1. Seed enterprise development and management 13-24 Nov 05: 3 trainees**
- 2. Chemical and physical soil analysis 23-27 April 06: 10 trainees**
- 3. Insect taxonomy, anatomy, biological control 23 April-4 May 06: 1 trainee**
- 4. Plant taxonomy/herbarium/seed bank management 7-11 May 06: 2 trainees**
- 5. Analysis of feed and food stuffs 11-22 June 06: 2 trainees**
- 6. Experimental design, techniques, analysis, reporting 25 June-6 July 06: 8 trainees**

Training



2006/07

Following courses have been conducted/agreed on:

- Expert Systems in Agric Research and Prodn, 5-16 Nov 2006, 4 trainees
- Automated library and information management, 12-23 Nov 2006, 1 trainee

- Seed health testing, 18-29 March 2007, 5 trainees
- Weed management/control, 18-29 March 2007, 3 trainees

10 places available for further courses in 2007. A list of 2007 courses distributed for MOA/DOA advice on preferred courses and nominated trainees

DOA/MOA advice required

Training



Australian study-tours/training (6-8 weeks)

- 3 places available (funds with Australian institutions)
- targeted for April-Nov cropping season

2006

- first trainee visit for autumn visit to Adelaide University to study crop establishment (zero-tillage, stubble mulching) postponed until start of 2007

2007

- last full Australian cropping season during the life of the project
- visits at the same time in April-June to University of Adelaide, Department of Agriculture WA and University of WA (CLIMA)

Progress

- 6 nominations from MOA in January
(Criteria: from Ninevah, good English, MSc/PhD, crop research/extension)
- **discuss/select 3 trainees urgently to allow visa, travel, training preparation**

Capital equipment

Zero-till seeders

- purchased 4 Indian zero-till seeders in 2005 for US\$7000

Seed cleaners

- MOA/DOA recommended allocating capital budget to seed cleaning machines to promote distribution/uptake of improved seed
- quotes and specifications obtained for Indian Agrosaw (US\$60,000) (A\$83,000) and Syrian Darbus (US\$20,000) cleaners
- possible to purchase 10 Darbas cleaners from available US\$257,275
 - US\$50,000 left for transport, training and spare parts
 - supply easier and cheaper from Syria
- MOA/DOA officials/engineers inspect/discuss in Oct 06 and Jan 07
- DOA/MOA preference/approval in writing urgently required

Problems 2005/06

- **implementation difficult due to political and security situation:**
 - changes in Minister of Agriculture (twice) and MOA Coordinator
 - referendum and election
 - security concerns constraining field activity
 - land disputes preventing activity at Tel Afar and Rabeea research stations
- **country visits by ICARDA and Australian collaborators to inspect and interact on trials/demonstrations not possible**
- **some research trials/nurseries and demonstrations evaluating improved lines/varieties and agronomy not conducted due to heavy rain, security concerns, land disputes, experimental design, lack of machinery, transport shortages**
- **the autumn (April 06) trainee visit to Australia postponed**

Program and workplan 2006/07

Under implementation

- seed dispatch to Mosul
 - 2 tonnes sent Dec 06
- demonstrations in 12 locations in Ninevah
- research trials in Ninevah and ICARDA
- training
 - 23 trainees to ICARDA
 - 3 trainees to Australia
- capital equipment for Ninevah
 - seed cleaners (10), subsoilers (2)



In preparation

- 2005/06 technical report

Conclusion 2005/06

The project has gone very well since start (1 May 2005) due to:

- **enthusiasm, industry, flexibility, dedication of Iraqi collaborators**
- **strong interest/support of ICARDA and Australian collaborators**
- **proximity of ICARDA**