Minutes and 2006/07 Workplan

Iraq-ICARDA-Australia Project (ACIAR CIM/2004/024) Better crop germplasm and management for improved production of wheat, barley and pulse and forage legumes in Iraq

Project reporting and planning meeting 1-5 October 2006 ICARDA, Aleppo, Syria

Contents

1. Items arising from the meeting for action

1. Complete baseline survey analysis and report	Drs Shideed, Mohamed , Abdul Kahar, Al-Niami, Abdullah
2. Complete meeting minutes and 06/07 workplan	Dr Piggin and ICARDA scientists
3. Complete 05/06 technical report	Dr Piggin and all scientists
4. Obtain MOA approval to purchase seed cleaners	Drs Bader, Al-Rajbu
5. M/DOA to nominate 3 trainees for Australia	Drs Bader, Al-Rajbu and MOA
6. M/DOA to nominate training courses/participants	Drs Bader, Al-Rajbu and MOA
7. Prepare/dispatch R & D seed to Mosul	Dr Niane + ICARDA breeders
8. Bank details and procedures for transfer of funds	Drs Bader, Al-Rajbu and MOA
9. Prepare sites and seed for planting	Dr Al-Rajbu and DOA/MOA Ninevah
10. Plant and measure demos/trials as planned	Dr Al-Rajbu/Dr Adary and DOA/MOA

2. Meeting Report

Purpose

The meeting was an agreed activity in the project document and aimed to report on the 2005/06 research and demonstration achievements and develop the workplan for the 2006/07 research and demonstration program. The detailed objectives of the meeting were as follows:

- For research and demonstrations on legumes, cereals, agronomy and the baseline survey:
  - review/evaluate/report 2005/06 activities and results
  - develop 2006/07 workplans
- Review 2005/06 progress and 2006/07 plans for:
  - training
  - capital items
  - finance

    - seed requirements
    - Iraq cropping review
- Facilitate exchange of information and experiences through seminars by Australian collaborators on relevant crop-livestock systems in Iraq/Australia

Planned outputs from the meeting were:

- presentations on 2005/06 technical results according to the agreed workplan
- presentations on agreed 2006/07 workplan compatible with:
    - objectives, outputs (Table 3.2), activities (3.3a Flow chart) and budget
- draft reports
    - 2005/06 technical report
    - 2006/07 workplan
- agreed strategy to implement the workplan

Agenda

The meeting was held over five days at ICARDA. The agenda is in Appendix 1. There were 7 participants from MOA (4 from Baghdad, 3 from Mosul), 11 from DOA Ninevah, 2 from University of Mosul, 3 from Australia and some 15 from ICARDA (see Appendix 2).

Participants were officially welcomed to the meeting by Dr Mahmoud Solh, ICARDA DG, and Dr Saleh Bader, DG State Board of Research MOA. Dr Piggin gave an overview of background and achievements of the project to date.

Because of the difficulties for collaborators to get together, the first day was spent in working groups preparing and reviewing 2005/06 results and presentations for legumes, cereals, socio-economics, and agronomy. These were presented on the second day and third morning. 2006/07 workplans were prepared/discussed on the third afternoon and fourth day and presented on the fifth morning. The fifth afternoon was used to review/plan/discuss training, capital items, finance, seed, cropping review, and other issues

A technical report on results from the baseline survey, demonstrations, and research is being prepared. The agreed workplan is detailed below under cereals, legumes and crop management.

Seminar series

A highlight of the meeting was a series of lunch-time seminars by the Australian participants on various aspects of advanced crop research and development in Australia, to expose, illustrate and discuss diversity in approaches to crop yield improvement, especially to Iraqi scientists who have had opportunities to interact internationally quite curtailed over the last decade. The seminars, each attended by some 50 ICARDA and ACIAR-project scientists, were as follows:

- "Dryland cropping in Iraq - the way forward." Dr Wal Anderson, Principal Research Agronomist, AgWA, WA
- "Chickpea collections: G*E responses and characterization of habitats." Dr. Jens Berger, Ecophysiologist, CSIRO Plant Industry, WA
- "Farming System Changes in Southern Australia." Dr David Coventry, Adelaide University, South Australia

- "Agronomy as applied ecology-or why we shouldn't lose sight of the big picture when marking the white pegs. A chickpea example." Dr. Jens Berger, CSIRO.

Training

ICARDA-based training

There are 23 places available for short-term training at ICARDA each year. There were in fact 26 trainees attending 6 courses in 2005/06. These are detailed in the 2005/06 annual project report to ACIAR. For 2006/07, the following courses have been agreed on:

- Utilization of Expert Systems in Agricultural Research and Production, 5-16 Nov 2006, ICARDA, 4 trainees
- Automated library and information management, 12-23 November 2006, ICARDA, 1 trainee
- Seed health testing, 18-29 March 2007, ICARDA, 4 trainees
- Weed management/control, 18-29 March 2007, ICARDA, 2 trainees

There are 12 places available for further courses in 2007. There was discussion at the meeting that further training should be directed at IPM, Genstat, chickpea/lentil breeding/selection, seed inspection, GIS, and research station management/machinery evaluation. A list of 2007 ICARDA courses (Appendix 3) has been sent to MOA/DOA requesting advice on preferred courses and nominated trainees.

Study/training visits to Australia

Due to difficulties in trainee nomination and timing for the first 6-week autumn visit to Adelaide University to study crop establishment (zero-tillage, stubble mulching), it was agreed to postpone the Australian training until the start of the cropping season in May-June 2007. As this is the last full Australian cropping season during the life of the project, it has been proposed that the three trainees proposed/funded in the project undertake visits during the April-November 2007 cropping season - one each to the University of Adelaide, Department of Agriculture Western Australia, and CLIMA University of Western Australia. The need for timely (before the end of 2006) nominations of suitable candidates from Ninevah with good English, an MSc/PhD, and expected continuing involvement on crop research was discussed, to allow visa, travel and training preparations to be made. MOA/DOA (Dr Bader/Dr Adary) are to follow up.

Capital items:

MOA/DOA recommended allocating the capital budget to seed cleaning machines to promote distribution and uptake of improved seed to farmers. This was agreed and quotes and specifications obtained for various machines, with MOA/DOA advising a preference for Indian Agrosaw machines. However, as it was only possible with the available funds to purchase four of the MOA-preferred Indian Agrosaw models at a price of about US$60,000 (A$83,000) each, and MOA would like 10 units, this was reconsidered and further information supplied on a cheaper Syrian-made machine which was included in the initial quote information sent to MOA. Full details of this machine, worth about US$20,000 (US$15,000 for the unit and diesel generator plus $5000 for an added gravity table), and considered by ICARDA Seed Unit to be of similar quality/robustness to the Indian machine, was sent to DOA Ninevah in August 06. It would be possible to purchase 10 of these machines from the available budget of A$347, 669 (about US$257,275) for capital items (at an exchange rate of A$1 = US$0.74), with US$50,000+ left for transport, training and other items. Transport, training and spare parts would also be much easier

and cheaper from Syria. MOA/DOA officials/engineers participating in the October 2006 annual reporting/planning meeting inspected and discussed the Syrian-made Darbas seed cleaning machine with the manufacturer from Qamishli in NE Syria. A recommendation is awaited from DOA/MOA to proceed.

Finance
Allocations and expenditure (A$) in the first year (May 05-April 06) were as follows:

Institution	**Payment 1 (1/5/05)**	**Acquittal (1/5/05 to 31/4/06)**
ICARDA	54 203	57 752
AgWA	13 000	13 500
CLIMA	13 000	26 000
UniAdelaide	19 000	46 000
MOA Iraq	356 000	15 491
Total	455 863	155 743

The unexpended carryover balance was $300 120. This unexpended balance was due to:

- low expenditure on the capital budget pending MOA approval for the purchase of MOA-requested seed cleaners
- inability to transfer operational funds to Iraq because MOA/DOA was unable to advise bank transfer details

To solve the problem with fund transfers to Iraq, accountants from DOA Mosul visited ICARDA in June 2006. They interacted with the Finance group to acquit funds advanced from MOA Baghdad for project operations and establish a secure system approved by the MOA Minister to transfer project funds to MOA/DOA Iraq. This was achieved and the balance of the first-year operational funding of A$60,000 (US$43,754.10) was transferred to the MOA Baghdad Bank via the ICARDA Office in Jordan on 28 June 2006. There was some delay but MOA/DOA confirmed funds were received on 6 September 2006.

Unfortunately, this system has broken down. This was discussed in the meeting and Drs Bader/Al Rajbu agreed to follow-up and advise a new DOA/MOA system to allow the 2nd payment (A$66,000) to be sent in time for the 2006/07 cropping season. It was emphasized that the system must be approved by MOA Baghdad/DOA Ninevah and the exact details of the system/account for the transfer must be advised to ICARDA. The payment is due on 1 November 2006 and will be transferred on receipt of an acquittal of funds received and an invoice for the second payment from DOA/MOA.

Summary of project achievements 2005-06
In summary, the achievements for 2005/06 were reported as follows:

- a workplan was developed at three meetings at ICARDA in June, July and September 2005 with ICARDA, Iraqi and Australian scientists. Required seed (16t) was supplied from ICARDA and Australia in October 2006

- the College of Agriculture and Forestry of Mosul University was added as a collaborator to the project to assist with socio-economic work in collaboration with the State Board of Agricultural Research MOA Baghdad. A major baseline survey of 260 farm families was undertaken in July-Sept 2005 by University of Mosul, MOA Baghdad and ICARDA socio-economists. This has been analyzed and gives a lot of insights on current systems and constraints to cropping and agriculture in Ninevah and will help direct research efforts and evaluate project outcomes and impacts
- the Ninevah Implementation Committee, set up by MOA to manage the project, met and produced minutes from 18 meetings which discussed and coordinated Iraqi activity
- the demonstration program was implemented in 13 locations in the four main agroclimatic zones as planned. This compared farmer and improved crop management with 2-3 local and improved varieties. Often, improved varieties and management increased crop yields. Farmer field days were held at all locations.
- in the ambitious Iraqi research program, 30 of the 80 planned research trials evaluating better adapted lines/varieties and management technologies were conducted. Many new lines of the tested cereal and legume crops yielded better than local check varieties
- in linked research at ICARDA on new technologies, trials were undertaken evaluating zero-tillage of chickpea and wheat, and the performance of a range of Australian varieties/lines of oats, peas, canola and other oilseeds, with potential for adaptation and use in Iraq. Zero-tillage and some varieties of these new crops showed great promise. The trials were shown to and discussed with several groups of visiting Iraqi scientists and seed collected for 2006/07 testing.
- the agreed training program was exceeded with 26 Iraqis participating in 6 training courses on: Seed enterprise development and management; Chemical and Physical Soil Analysis; Insect taxonomy, anatomy and biological control; Plant taxonomy and herbarium/seed bank management: Analysis of feed stuffs; Experimental designs, data analysis, field plot techniques, scientific writing, and data presentation
- Capital purchase of 4 zero-till seeders was completed and of seed cleaning plants is under way
- Operational funds were transferred to all partners and to Iraq
- ICARDA reported monthly to ACIAR/AusAID on project activities and progress
- the annual report (July 2006) and 6-monthly financial acquittals (November 2005 and April 2006) were prepared and sent to ACIAR.

Problems encountered were reported as:

- implementation has been difficult given the political and security situation in Iraq. There have been changes in the Minister of Agriculture (twice) and MOA Coordinator, a referendum and election, security concerns constraining field activity, land disputes preventing activity at Tel Afar and Al Rashidya research stations, and difficulties with transfer of project funds to Iraq
- in-country field visits by ICARDA and Australian collaborators to inspect and interact on trials/demonstrations were not possible
- 50 of the 80 planned research trials evaluating better adapted lines/varieties could not be conducted due to heavy rain, security concerns, land disputes and transport shortages and, in hindsight, an over-ambitious workplan for the resources and constraints present in Ninevah.

- planned research trials and demonstrations on agronomy/crop management were postponed until 2006/07 because of security concerns, land disputes, lack of machinery, transport shortages and some confusion about agreed treatments/available seed/plot sizes for demonstrations.
- the programmed visit of a trainee to Adelaide University in autumn (April-May) to study conservation cropping with Professor David Coventry was postponed until May-June 2007 due to nomination difficulties.

Overall, it was agreed the project has gone remarkably well since commencement on 1 May 2005 due to:

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

3) Workplans for 2006/07

Using the experience of 2005/06, more manageable and realistic workplans were developed for cereal evaluation, legume evaluation, agronomy, socio-economic, and seed production R & D for 2006/07. These are detailed below.

For demonstrations and research trials on better crop varieties/lines and crop management technologies, the target locations are as follows: High Rainfall areas (HRA): Al-Shekhan, Rabiah, Al-Koush; Medium Rainfall Areas (MRA): Al-Hamadaniah, Tel-Kef, Basheeka; Low Rainfall Areas (LRA): Tel-Abta, Al-Hadar, Al-Mahlabiah); Supplementary Irrigation (SI) Rabiah, Al-Namroud, Hmeidat. The locations are detailed in Figure 1.

All demonstration locations are in farmer fields with farmer participation in crop management and technology evaluation. Research trials will be undertaken mainly at Rashidia Research Station in Mosul (MRA) with some at other stations/locations [suggested in the workplan] depending on the security situation and available resources. Research trials will be managed by researchers in consultation with extension officers and farmers with farmer participation in technology evaluation.

3.1) Cereals

Testing locations:

	HRA	**MRA**	**LRA**	**SI**
Barley		x	x	
Bread wheat	x	x		x
Durum wheat	x	x		x

3.1.1) Demonstrations

3.1.1a) barley

MRA	**LRA**
1 ha demonstrations in 3 sites	

Rihane-03	Zanbaka
Gezira 1	Local black
10x10m in 1 site (observation and seed production)	
Alanda-01	Zanbaka/SLB22-74
FAT05IN-133	Yazan

3.1.1b) durum wheat

HRA	**MRA**	**SI**
1 ha demonstrations in 3 sites		
Cham 3	Omrabia 5	Omrabia 5
Garonia (local)	Cham 5*	Cham 3
	Garonia (local)	
	* only in Bashiqa	
10x10m in 1 site (observation and seed production)		
Icasyr2	Fadda98	Lahnhaucan

3.1.1c) bread wheat

HRA	**MRA**	**SI**
1 ha demonstrations in 3 sites		
AboGhraib 3	AbuGhraib 3	Adnanya
Cham 6	Tel Affer 3*	Tel Afar 3
Cham 4*	Cham 6	
* only in Al-Kosh	* only in Tel Keif	
10x10m in 1 site (observation and seed production)		
DAJAJ-5	BABAGA-3	QIMMA-6
ANGI-4	BOOMA-2	IZAZ-11

3.1.2) Research – Promising lines

Nursery and yield trial evaluations will be conducted as follows:

3.1.2a) barley

MRA	**LRA**
Nurseries	
MRA barley nursery (100 entries, 2 row black/6 row white)	LRA barley nursery (100 entries, 2 row, black seeded)
Yield trials	
IBYT-MRA (24 Entries including checks)	IBYT-LRA-W (24 entries including checks)

Possible locations	
Farmer Fields: Tel Kafe, Hamdanya Research Stations: Al-Rashidya, Al-Namrood	Farmer Fields: Hatra, Tel Abta

3.1.2b) durum wheat

HRA	MRA	SI
Nurseries		
30th Durum Observation Nursery	30th Durum Observation Nursery	30th Durum Observation Nursery
Yield trials		
30th Dryland Durum yield Trial- Continental Areas	30th Dryland Durum yield Trial- Continental Areas	30th Dryland Durum yield Trial- Continental Areas
27th Dryland Durum yield Trial- Temperate Areas	27th Dryland Durum yield Trial- Temperate Areas	27th Dryland Durum yield Trial- Temperate Areas
		1st Irrigated Areas Durum Yield Trial
Possible locations		
Farmer fields: Al-Koush	Research station: Rashidya	Research station: Al-Namroud

3.1.2c) bread wheat

HRA	MRA	SI
Nurseries		
CWANA 7th Spring Bread Wheat Observation Nursery (7th SBW-ON) (180 Entries including checks)	CWANA 7th Spring Bread Wheat Observation Nursery (7th SBW-ON) (180 Entries including checks)	CWANA 7th Spring Bread Wheat Observation Nursery (7th SBW-ON) (180 Entries including Checks)
Yield trials		
	CWANA-Temperate Areas 7th Dryland Spring Bread Wheat Yield Trial (CWANA-TA 7th DSBWYT) 24 Entries including checks	CWANA-Temperate Areas 7th Dryland Spring Bread Wheat Yield Trial (CWANA-TA 7th DSBWYT) 24 Entries including checks
	CWANA-Continental Areas 7th Dryland Spring Bread Wheat Yield Trial (CWANA-CA 7th DSBWYT)	CWANA-Continental Areas 7th Dryland Spring Bread Wheat Yield Trial (CWANA-CA 7th DSBWYT)

	24 Entries including checks	24 Entries including checks
CWANA-Continental /Irrigated Areas 7th Irrigated Spring Bread Wheat Yield Trial (CWANA-CA 7th IRSBWYT) 24 Entries including checks	CWANA-Continental /Irrigated Areas 7th Irrigated Spring Bread Wheat Yield Trial (CWANA-CA 7th IRSBWYT) 24 Entries including checks	CWANA-Continental /Irrigated Areas 7th Irrigated Spring Bread Wheat Yield Trial (CWANA-CA 7th IRSBWYT) 24 Entries including checks
Possible locations		
Farmer fields: Al-Koush	Farmer fields: Telkef, Hamadaniah, Basheeka Research stations: Rashidya, Namroud	Farmer fields: Al-Namroud

3.2) Food legumes

Varieties and lines for demonstrations and research trials are specified below. All varieties mentioned in HRA and MRA could also be tested under SI.

3.2a) Chickpea

	HRA **(No SI required)**	**MRA** **(with SI as required)**	**LRA**	**Comments**
Demos	Dijla (FLIP 3279) 510 IPA (FLIP 86-05 Ghab 4 (FLIP 93-93) Local cultivar Location: Al Shekhan	Dijla (FLIP 3279) IPA 510 (FLIP 86-05) Ghab 4 (FLIP 93-93) New line (from Dr Malhotra-2 locations) Local cultivar Locations: Al-Kosh, Hamdania, Mahlabiah	.	1.Winter planting: All lines + local (ICM + IPM) 2. Spring planting: All lines + local (ICM + IPM) 3. Spring planting local (with farmer's practice)
Research	FLIP 97-530 (Almaz) FLIP 97-503 (Nafice) FLIP 97-588 FLIP 97-677 FLIP 97-706 FLIP 97-657 3 yield trials with last years selections International nurseries	FLIP 97-530 Almaz) FLIP 97-503 (Nafice) FLIP 97-588 FLIP 97-677 FLIP 97-706 FLIP 97-657		Seed increase of elite lines for future experimentation, release and dissemination

	CIEN-LA-2007 Location: Mosul Research Station			

3.2b) Lentil

	HRA	**MRA**	**LRA**	**Comments**
Demos	-	Baraka (Idlib 1) IPA 98 (Idlib 2) Idlib 3 Local Locations: Hamdanyia, Telkeif		Three improved lines/varieties and local cultivar planted in winter at all locations. ICM and IPM will be used to demonstrate the whole package
Research	-	ILL 590, 6829, 7012*. 7978, 7979, 8090, 9902, 9938, 9939, 9962, 9980, 9998 2 yield trials with last years selections Location: Mosul Research Station		Seed increase of elite lines for future experimentation, release and dissemination

3.2c) Faba bean

	HRA	**MRA**	**LRA**	**Comments**
Demos	Aquadulce ILB 1814 Local cultivar			Each demonstration on 0.5 ha in three locations. ICM and IPM will be used

Research	ILB1814-L-2 ILB1814-L-12 ILB 1814-L-62 ILB 1814-L-63 ILB 1814-L-86 Fiesta, Ascot, Cairo, Farah Sel 97/ Lat 97 92-1 Sel -F6 / 1431 / 2003 Sel -F6 / 1432 / 2003 Sel -F6 / 1433 / 2003 Sel -F6 / 1434 / 2003 -2 Sel -F6 / 1435 / 2003 Sel -F6 / 1438 / 2003 -1 Sel -F6 / 1438 / 2003 -2 Sel -F6 / 1441 / 2003 -2 Sel -F6 / 1443 / 2003 Sel -F6 / 1444 / 2003 Sel -F6 / 1445 / 2003 Sel 97 Lat 97 95-1 Sel 97 Lat 97 / 95 -3 Sel 97 Lat 97 97-2 Location: Mosul Research Station			Seed increase of elite lines for future experimentation, release and dissemination 15 lines with high auto-fertility

3.3) Forage Legumes

	Species	**HRA**	**MRA** Seed + Hay	**LRA** Feed	**Comments**
Demos	*V. sativa*		IPA 2001	IPA 2001	
	V. dasycarpa		Kouhak		
	L. sativus		Ali-bar,#587		
Research	International nurseries		IFLVS Locations: Hamdania, TelKeif, Bashika		Last year's trials

General notes on cereal and legume adaptation demonstrations and research trials:

1. demonstrations will include comparisons of introduced and local varieties under three (3) crop establishment and management technologies: farmer practice, modified tillage, and zero-tillage (see under agronomy below)
2. optimum sowing dates: chickpea (last week of December); lentil (last week of November); faba bean (early November); forage legumes (last week of November), cereals (mid-December)
3. seed rates: chickpea (120 kg/ha); lentil (120 kg/ha); faba bean (120 kg/ha); forage legumes (*V.sativa* 100kg/ha; *V. dasycarpa* 80 kg/ha; *L. sativus* 100 kg/ha; *V. narbonensis* 120 kg/ha), barley (120 kg/ha), durum wheat (140 kg/ha), bread wheat (120 kg/ha)
4. plot size for demonstrations (0.5 to 1 ha) will be decided by Iraqi scientists based on the availability of land at each site. The international nurseries have clear instructions on the number of rows and row length etc in the package
5. in order to demonstrate the beneficial effect of legumes for following cereal crops each demonstration sites should include appropriate cereal and fallow phases of the rotation. This will help to establish appropriate crop rotations and assess the value of legumes in the following season.

3.4) Agronomy/crop management

3.4.1 Demonstrations - tillage/sowing

It is planned to conduct tillage/sowing demonstrations as part of the crop/variety demonstrations in 3 locations in each agro-climatic zone, comparing farmer practice, modified tillage, and zero-tillage for each of the test crop varieties. If this is not manageable, there should be at least one tillage/sowing demonstration in each zone. Demonstrations with the different crops may be with different farmers to make implementation easier.

Plot size: 0.5 - 1.0 ha

Issues addressed	**HRA (no fallow used)**	**MRA (25% fallow used)**	**LRA (50% fallow used)**
Tillage/ sowing			
1. Farmer practice - Late sowing - Non-uniformity of seeds - Late emergence - Soil degradation	1. Moldboard after harvest of previous crop + broadcast seed and fertilizer + cover with one way disk after rain (~Dec 15) (160 kg seed/ha)	1. One way disk after harvest of lentil + broadcast seed and fertilizer + cover with one way disk after rain (disk drill)(~Dec 15) (160 kg seed/ha)	1. One way disk after vetch grazing in early May or after barley harvest + broadcast seed + cover with one way disk before rain (disk drill)(~Nov 15) (120 kg seed/ha)
2. Modified tillage - Better soil	2. Chisel (20 cm)) after harvest of	2. Chisel (20 cm) after harvest of lentil +	2. Chisel (20 cm) after harvest of vetch +

structure - Uniform seed distribution - Lower seed rate **3. Zero-tillage** - Better soil structure - Uniform seed distribution - Early emergence - Lower seed rate	chickpea + Ducks-foot after rain (12 cm) + drill after rain (~ Dec 15) (120 kg seed/ha) 3. Use Roundup (1 l/ha) after initial rain for weed control + direct sowing by zero-till drill (~ Early Dec) (120 kg seed/ha)	Ducks-foot after rain (12 cm) + drill after rain (~ Dec 15) (120 kg seed/ha) 3. Use Roundup (1 l/ha) after initial rain for weed control + direct sowing by zero-till drill (~ Early December) (120 kg seed/ha)	Ducks-foot plow before rain (12 cm) + drill before rain (~ Nov 15) (120 kg seed/ha) 3. Use Roundup (1 l/ha) after initial rain for weed control if present + direct sowing by zero-till drill (~ Early Nov) (120 kg seed/ha)
SI location: The treatments in MRA will be repeated in SI sites			

Recommended management for tillage/sowing demonstrations			
Varieties	The same varieties used for cereal and legume demonstrations	The same varieties used for cereal and legume demonstrations	The same varieties used for cereal and legume demonstrations

Suggested measurements in demonstrations:

- crop factors (date of sowing, emergence, flowering, maturity; grain and straw yield; grain quality)
- pest/disease incidences monitored
- economics (in consultation with socio-economic team)
- environmental parameters (weather data)

3.4.2 Research

3.4.2a Conservation tillage (tillage and stubble mulching)

	HRA	MRA (Dr Adary to follow up; Loc: Rashadieh)	LRA
<u>Treatments</u> Cereal/legume rotations by two phases - Large plots (10*20 m) - 3 replicates	Nil	1. Conventional mouldboard plow (+/- stubble) 2. Minimum tillage (+/- stubble) 3. Zero tillage (+/- stubble) (Total area: 2 ha)	Nil

Recommended management of conservation tillage trials			
Varieties	Nil	Om Rabia wheat/Idleb 3 lentil	Nil
Fertilizer (wheat)		60 kg DAP-18-46%/ha at planting + 30 kg urea/ha as top dressing	
Fertilizer (legume)		50 kg DAP/ha planting	
Weed control (wheat)		Chevalier (20 g ai/ha) early post-emergence	
Weed control (legumes)		Challenge (600 g ai/ha) for broad leaves and Fusilade (0.25 kg ai/ha) for grasses post-emergence 4-6 weeks after sowing	
Moldboard plow at 20-25 cm; minimum tillage with chisel cultivator at 10-12 cm depth; zero-till with Indian ZT seeder			

Suggested observations/measurements in conservation tillage trial:

- soil parameters (soil moisture at planting, flowering and harvest at 0-10cm and 20 cm intervals until 120 cm; nutrients at the same depths; OM 0-10, 10-20 cm; bulk density at 20 cm with 10 cm interval; porosity at 20 cm with 10 cm intervals)
- pest/disease incidence
- crop factors (grain and straw yield and yield parameters at harvest; TDM at flowering; phenology; grain quality)
- economics
- environmental parameters (weather data)

3.4.2b Deep tillage

Aim: To investigate the effectiveness of deep tillage with application of gypsum to overcome soil compaction in Ninevah, Northern Iraq.

Two sites in farmers' fields in the MRA and LRA are proposed for the experiments [NB: This can be varied according to resources].

Experimental Treatments:
Randomized complete block design (RCBD) with 4 replicates

1. nil (control): use normal farmer methods of cultivation
2. deep rip to 40cm only.
3. apply 5 t/ha of gypsum to the soil surface only (incorporate with light cultivation after rain)
4. apply 5t/ha of gypsum to the soil surface and then deep rip to 40cm.

NB: All deep tillage (ripping) treatments should:

a) rip after rain (15-30mm) when the soil moisture is at field capacity

b) break down large clods after ripping with light cultivation
c) apply the 5t/ha gypsum to the soil surface before ripping and before the first rains if possible.

The Indian zero tillage seeder will be used to sow the crop on all tillage treatments (1-4)

Methods:

Agronomy/crop management

A. *Each year*
   - apply complete nutrients to all plots according to soil test
   - sow as soon as practical after the first rains of the season and use the crop appropriate to the sowing time. e.g. wheat (MRA) and barley ((LRA) in November or December; lentil or chickpea in December or January.
   - seed rate should be appropriate for each crop (see recommendation below).
   - weed control by appropriate herbicides (see recommendation below).
   - use the normal rotation at the site. e.g. lentil-wheat-lentil-wheat (because of the need to procure the vibrated sub-soiler from outside Iraq the trial could start with lentil after wheat). Idleb 3 (lentil) and Om Rabia (durum wheat) will be used

B. *After harvest each year*
   - return all crop residues to the soil
   - keep animals off the plot area
   - continue the experiment for 4 years on the same plots BUT only apply the deep tillage and gypsum in the first year. Use zero tillage seeder to sow the plots after application of Roundup each year.

Measurements:

1. depth to compact layer before the experiment and in each plot at sowing each year (use pointed steel rod of about 1 m)
2. test the topsoil (0-10cm) for nutrients each year
3. count plants/m^2 on 3 x 1m rows in each plot, each year
4. measure grain yield mechanically if possible OR by hand from 3x $1m^2$ quadrats per plot.
5. measure yield components and straw yield on 3 x 1m rows per plot

3.4.2c Agronomy trials at ICARDA

In agronomy studies at ICARDA linked to the project, four trials comparing zero-tillage vs. conventional cultivation of oats, wheat, chickpea, and barley using the Indian zero-till planter and three trials on adaptation/seed increase of Australian-supplied oilseeds, peas and oats will be conducted. These continue zero-till and adaptation research commenced in 2005/06. These will give good information on new systems of conservation cropping (zero-tillage, stubble mulching, rotations) and be useful for training of Iraqi visitors.

General notes on optimum management for agronomy/crop management demonstrations and research trials unless otherwise specified by treatments:

Optimum management for chickpea:

- moldboard after harvest of wheat (20 cm) + cultivator (10-12 cm) after rain + planting by drill
- HPR (Ghab 3 or 4)
- seed treatment (Vitavax)
- planting at end December with 120 kg/ha seed
- fertilizer: 50 kg DAP/ha at planting
- weeding or chemical weed control [Challenge (600 g ai/ha) for broad leaves and Fusilade (0.25 kg ai/ha) for grasses as post-em 4-6 weeks after sowing]
- 1 foliar spray 4 weeks after emergence (Chlorathalonil); 2nd spray if wet front

Optimum management for lentil and vetch:

- chisel after harvest of wheat (20 cm) + cultivator (10-12 cm) after rain + planting by drill
- HPR (Idleb 2 in LRA; Idleb 3 in MRA)
- seed treatment (Vitavax)
- planting end November with 120 kg/ha seed rate (lentil and V. narbonensis) and 100 kg/ha (Vicia and Lathyrus spp) and 80 kg/ha (V. dasycarpa)
- fertilizer: 50 kg DAP/ha at planting
- weeding or chemical weed control [Challenge (600 g ai/ha) in lentil and Basagran (500 g ai/ha) in vetch for broad leaves and Fusilade (0.25 kg ai/ha) in both crops for grasses as post-em, 4-6 weeks after sowing]

Optimum Management for Cereals:

- mouldboard plow after harvest of wheat (20 cm) + cultivator (10-12 cm) after rain + planting by drill (in HRA)
- chisel after harvest of wheat (20 cm) + cultivator (10-12 cm) after rain + planting by drill (in MRA and LRA)
- HPR (Bread wheat: Abu Graib3 or Cham 6 for HRA; Durum wheat: Waha or Om Rabia 5 for MRA; Barley: A. Aswad for LRA)
- seed treatment (Vitavax)
- planting after rain in December with seed rates of 120 kg/ha (BW), 140 kg/ha (DW) or 120 kg/ha (barley)
- fertilizer: 100 kg DAP-18-46%/ha at planting + 90 kg Urea/ha as top dressing (HRA); 60 kg DAP-18-46%/ha at planting + 30 kg Urea/ha as top dressing (MRA); 50 kg DAP-18-46%/ha at planting + 15 kg Urea/ha as top dressing (LRA)
- weed control: Chevalier (20 g ai/ha) early post-em for wheat in HRA and MRA); no weed control for barley other than 2,4-D at tillering stage if necessary

3.5) Integrated disease and pest management (IDPM)

Although there was no formal IPDM program in 2005/06, the major diseases and pests noted with a level of infestation of 30-100% were:

- cereal leaf minor
- stem sawfly
- sunn pest
- helminthosporium

- rhynchosporium

Ascochyta blights were also present but localized.

It was proposed in 2006/07 to have a more formal IDPM component linked into the demonstrations and research trials, collaborating with the crop protection group at the University of Mosul [Dr Suad Abdallah Ardini (leader and entomologist), Dr. Khaled Hassan Taha (pathologist), Virologist (to be identified), Weed Scientist ((to be identified)]. The agreed activities were as follows:

- monitor the pest/disease situation in farmer fields and demonstration plots
- initiate FFS for pest/disease identification/management in hot spots
- screen local Iraq varieties in pest/disease nurseries at ICARDA
- conduct an IPDM training course for 15-20 junior Iraqi scientists at ICARDA
- send monitoring nurseries to specialists
- discuss/agree on workplan implementation with involved Iraqi scientists at the 9th Arab Congress of Plant Protection on 19-23 November 2006 in Damascus

3.6) Socio-economics

The program follows the list of activities in the Project Document under 3.3. a. Flow chart (Methodologies).

Activity	**2005/2006**	**2006/2007**	**2007/2008**
1.2 Baseline survey and analysis of production constraints/limitations in individual agro-climatic zones	Survey - Data collection, analysis, discussion Constraints identified	Baseline survey report published	
1.8 Monitor demonstrations and jointly evaluate options with farmer groups to identify preferences and/or potential constraints to adoption		Input-output data collected and cost-benefit analyses of demonstrations commenced Farmer preferences recorded and potential constraints identified	Input-output data collected and cost-benefit analyses of demonstrations completed Farmer preferences recorded and potential constraints identified
1.11 Assess potential adoption and impact of technologies based		Adoption and impact assessment underway	Adoption and impact assessments completed (questionnaire

on information from baseline surveys and results from demonstrations			development, data collection/analysis, interpretation/reporting)
3.1/3.5/3.7 Joint evaluation of options with farmer groups. Identify potential constraints to adoption	Baseline survey (1.2)	Input-output data collected and cost-benefit analyses of research trials commenced Farmer preferences recorded and potential constraints identified	Input-output data collected and cost-benefit analyses of research trials Farmer preferences recorded and potential constraints identified
4.3 Individual training for MOA staff in economic analysis, adoption and impact assessment	Questionnaire Visits to ICARDA for baseline data analysis	Impact assessment workshop, ICARDA 5-9 Nov 06 Visits to jointly discuss/evaluate constraints, adoption and impact	Joint development of adoption and impact assessment survey Impact assessment (analysis/reporting) Visits to ICARDA for analysis/reporting

3.7) Seed supply and production

The Seed Unit is coordinating components to supply seed and equipment and improve seed production capacity in Iraq. These are represented in the Project Document under 3.3. a. Flow chart (Methodologies) as follows:

Activity	Time line	Milestone
2.9 Develop capacity at Rabia station to produce seed for research and demonstrations	Yr 1	Equipment purchased and seed quality control in place
4.2 Short-term training courses in seed production & seed quality control	Yrs 1, 2, 3	Iraqis complete training each year

Seed supply for R & D
It was agreed in 2005/06 that DOA Ninevah would save as much seed as possible from demonstrations and trials. This was done carefully with regular inspection to verify purity and most of the seed required for the 2006/07 program is available in Ninevah. ICARDA will supply limited seed (listed in Appendix 4) unavailable in Ninevah for demonstrations and research. The SU will coordinate assembly, testing and dispatch as soon as possible so that it is ready to send to Iraq in Nov/Dec 2006. It will be dispatched by truck to the Directorate of Agriculture, Ninevah Governorate, Mosul, Iraq (Dr Abdul Sattar Al-Rajbu, Director).

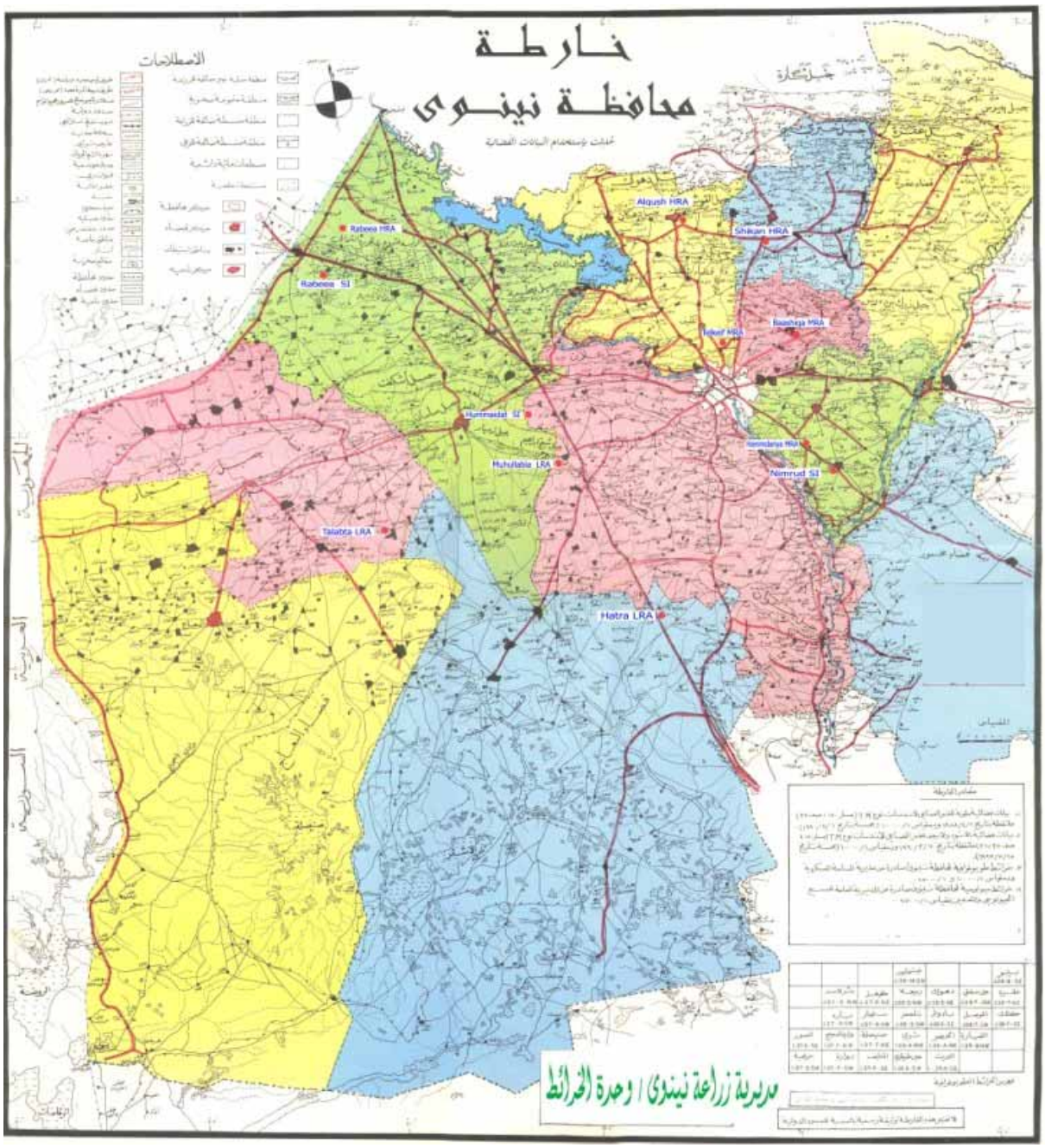
Developing capacity for seed production

Costing and specifications for several types of fixed and mobile seed cleaners were obtained during 2006. These were provided to DOA Ninevah with preference given for the purchase from the available budget of 10 Syrian-made mobile units - approval to proceed is still pending from MOA Baghdad. The Seed Unit will assist with further inspection and modification of specifications and purchase of preferred units in 2007, once MOA approval is provided.

Training

Selected Iraqi collaborators will participate in existing or specially designed courses on seed production and operation of the seed cleaners. The purpose is to strengthen the capacity in research stations to produce quality seed for demonstrations and maintaining released varieties.

Figure 1 Locations of demonstrations and research trials in Ninevah, Iraq (2005/06)



Appendix 1 Meeting agenda

International Center for Agricultural Research in the Dry Areas (ICARDA)

Iraq-ICARDA-ACIAR Project (CIM/2004/024) Better crop germplasm and management for improved production of wheat, barley and pulse and forage legumes in Iraq

2006/07 reporting/planning meeting

1-5 October 2006
ICARDA Aleppo, Syria

Agenda

Friday/Saturday 29-30 September 2006

Arrival of participants - accommodation at the ICARDA Guest House/Amir Palace Hotel

Sunday 1 October 2006

0800-0900	Transport to ICARDA Tel Hadya and registration		
0900-0930	Official opening	Dr M. Solh Dr Saleh Bader	
0930-1000	Introductions and program	Dr C. Piggin	
1000-1030	Group photo and coffee		
1030-1200	Review of results/presentations - research/demos	All scientists	
	- Legume group (Drs Bayaa, Sarker, Malhotra, Khalil)		Cubero Conference
	- Cereal group (Drs Grando, Abdalla, Nachit)		Ali El-Ali Conference
	- Baseline survey (Drs Shideed, Saad)		Clemence Conference
	- Agronomy group (Dr Pala)		Taher Obaid Conference
1200-1300	Lunch		
1300-1700	Continue review/preparation		
1700-1730	Transport: ICARDA –Guesthouse/Amir Palace Hotel		

Monday 2 October 2006

0730-0800	Transport: Guesthouse/Hotel - ICARDA	
0800-0900	Legume performance reports-research/demos	
	- Chickpea	Dr Malhotra
	- Lentil	Dr Sarker
	- Faba bean	Dr Khalil
	- Vetch	Dr Kasim
0900-0930	Coffee	
0930-1100	Legumes performance (cont)	
1100-1200	Cereal performance reports-research/demos	

	- Barley	Dr Grando
	- Bread wheat	Dr Abdalla
	- Durum wheat	Dr Nachit
1200-1300	Lunch	
1300-1400	Seminar: Dryland cropping in Iraq-the way forward	Dr Anderson
1400-1600	Cereal performance (cont)	
1600-1630	Transport: ICARDA-Guesthouse/Amir Palace Hotel	

Tuesday 3 October 2006

0730-0800	Transport: Guesthouse/Amir Palace Hotel - ICARDA	
0800-0900	Agronomy performance report	
	- zero-till and alternative crops	Dr Piggin
0900-0930	Morning tea/coffee	
0930-1100	Baseline survey report	Drs Shideed/Saad
1100-1200	Discussion group-agronomy workplan	Drs Pala/Coventry/Anderson
1200-1300	Lunch	
1300-1400	Seminar: Understanding GxE in chickpea	Dr. Berger
1400-1600	Agronomy workplan (cont)	
1600-1630	Transport: ICARDA-Guesthouse/Amir Palace Hotel	
1730-1930	Official invitation for EID Breakfast	Garden, Office (I)

Wednesday 4 October 2006

0730-0800	Transport: Guesthouse/Amir Palace Hotel - ICARDA	
0800-0900	Discussion group - legume workplan	Drs Bayaa/Sarker/Malhotra
0900-0930	Morning tea/coffee	
0930-1100	Legume workplan (cont)	
1100-1200	Discussion group - cereal workplan	Drs Grando/Abdalla/Nachit
1200-1300	Lunch	
1300-1400	Seminar: Farming System Changes in Southern Australia	Dr Coventry
1400-1600	Cereal workplan (cont)	
1600-1630	Transport: ICARDA-Guesthouse/Amir Palace Hotel	

Thursday 5 October 2006

0730-0800	Transport: Guesthouse/Amir Palace Hotel - ICARDA	
0800-0930	Presentation of workplans	
	- Cereals	Dr Grando
	- Legumes	Dr Bayaa
	- Agronomy	Dr Pala
	- Socio-economics	Drs Shideed/Saad
0930-1000	Morning tea/coffee	
1000-1100	Workplan reports (cont)	
1100-1200	Discussion on:	

- training (ICARDA and Australia)
- capital items
- finance
- seed requirements
- Iraq cropping review (Dr Kasim)
- other issues

1200-1300	Lunch	
1300-1430	Discussion (Cont.)	
1430-1500	Close	Drs Bader, Piggin
1500-1530	Transport: ICARDA-Guesthouse/Amir Palace Hotel	

Friday/Saturday 6-7 October 2006

Departure to Baghdad, Mosul and Australia according to transport arrangements

Prepared by: Dr. C. Piggin, MP4
Date: 1 October 2006

Appendix 2 Participants

Annual Reporting/Planning Meeting, Iraq-ICARDA-ACIAR Project (CIM/2004/024), 1-5 Oct 2006, ICARDA, Aleppo, Syria

Name/Title	Institution	Address	Fax/Tel	E-mail
Australia				
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MOA Baghdad/Mosul				
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Mr. Younis H. Qassim Seed Production	Ministry of Agriculture	Mosul, Ninevah		
DOA Mosul				
Dr. Abdulsattar Asmir Al-Rajbu Director	Directorate of Agriculture Ninevah	Mosul-Faisalya, Ninevah, Iraq	Mob: 00964-7701607473	agrimosul@yahoo.com
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Mr. Salim S. Esmael Agricultural Engineer	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq		
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Mr. Zuhar Salem Abou Agricultural Engineer	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq	Mob: 00964-77-17-9264	agrimosul@yahoo.com
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Mr. Abdul- Moniem M. Mohamed Follow up/Third Sector	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq	Mob: 00964-7701646935	Abdalmonemm@yahoo.com
Mr. Hazem Aziz Saleh Follow up/Second sector	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq	Mob: 00964-7709274	
Mr. Bassam Y. Qassim Follow up/First sector	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq	Off: 00964-60816782 Mob: 00964-7701724891	Bassam819@yahoo.com
Mr. Taha Ahmed Abd Al Azeez Agricultural Engineer	Directorate of Agriculture Ninevah	Mosul, Ninevah, Iraq		
University of Mosul				
Dr. Emad Yousif Ismael Abdullah, Assistant Professor, Economics	University of Mosul	Mosul, Iraq	Off: 00964-60-510916 Mob:00964-7701684744	
Dr. Suaad Irdeny Abdullah	College of Agriculture	Mosul, Ninevah, Iraq	Mob: 00964-7701631609	Suaad53irdeny@yahoo.com

Assistant Professor, Entomology	& Forestry, University of Mosul			Suaad_irdeny@yahoo.com
ICARDA				
Dr M. Solh Dr W. Erskine Dr C. Piggin Dr B. Bayaa Dr M. Abang Dr S. Kumari Dr A. Sarker Dr R. Malhotra Dr S. Khalil Dr S. Grando Dr O. Abdullah Dr M. Nachit Dr K. Shideed Dr M. Pala Dr M. Bohssini Dr A. Niane Mr A. Haddad	DG ADG-research Project leader Legume pathologist Legume pathologist Virologist Lentil breeder Chickpea breeder Faba bean breeder Barley breeder Wheat breeder Durum wheat breeder Socio-economist Agronomist Entomologist Seed specialist Agronomist		Off: 963 21 221 3433	name@cgiar.org

Appendix 3 ICARDA Course Schedule and Training Opportunities 2007

Headquarters Training Courses (Aleppo, Syria)*

Short-term Training Courses

4-5 February	Economics of seed production
March	Participatory plant breeding and seed supply
18-29 March	Seed health testing
25 March-5 April	Molecular characterisation of small ruminants
08-27 April	Integrated crop and livestock production
29 April-10 May	Integrated pest management of cereal and legume crops
29 April -10 May	Cereal Crop Improvement
6-10 May	Seed bank management for germplasm collection
6-17 May	Variety management and quality assurance
7 May-7 June	Water management for improved WUE in dry areas - water harvesting
17-28 June	Seed health testing
26 August-6 September	DNA molecular marker techniques for crop improvement
21 October-1 November	Using modern ICT in library and information management systems
4-15 November	Utilization of expert systems in agricultural research and production
18-29 November	Water productivity concepts and modeling
***	Integrated land managent in drylands
***	Livelihoods characterization, adoption and IA in Economic and Gender Analysis

Announcements for headquarters training courses, including course description and application procedures, will be sent to the concerned national agricultural research systems throughout the year, a few months before each course commences.

Individual Training

Individual non-degree training: Specialized non-degree training is available for individuals or small groups of candidates if officially requested by their national agricultural research systems.

For additional information, please contact: Human Resources Development Unit (ICARDA)
P.O. Box 5466, Aleppo, Syria. Tel: (963-21) 2225112, 2225012, 2213433, 2213477
Fax: (963-21) 2225105 or 2213490. E-mail: ICARDA @CGIAR.ORG.

Appendix 4 Seed to be dispatched from ICARDA to DOA Mosul Iraq for 2006/07 research trials and demonstrations

Crop	Variety	Quantity (kg)	No of containers	Source	Coordinator	Field	Year	Treated
Barley	Rihane-03	360	8	SU/MP-2	Hamadeh	B2	2005/06	Vitavax
	Zanbaka	200	4	SU/MP-2	Hamadeh	B2	2005/06	Vitavax
	Alanda-01	10	1	MP-2	Korieh	C10	2005/06	Vitavax
	Momtaz = (M126/CM67//As/Pro/3/Alanda)	10	1	MP-2	Korieh	C10	2005/06	Vitavax
	Alanda/Hamra/4/CompCr229//As46/Pro/3/Srs	10	1	MP-2	Korieh	A 13	2005/06	Vitavax
	Alanda/Zafraa//Asal	10	1	MP-2	Korieh	A 13	2005/06	Vitavax
	Rihane-03/4/Lignee527//Bahtim/DL71/3/Api/CM67//Mzq	7	1	MP-2	Korieh	A 13	2005/06	Vitavax
	Yazan = SLB03-10/Zanbaka	10	1	MP-2	Korieh	C10	2005/06	Vitavax
	Zanbaka/SLB22-74	10	1	MP-2	Korieh	A 13	2005/06	Vitavax
	Zanbaka/SLB21-81	10	1	MP-2	Korieh	A 13	2005/06	Vitavax
	2 sets nursery 100 plots for LRA (2 row, black)	1.5	100 envelops in 2 boxes	MP-2	Korieh	A-13	2005/06	Vitavax
	4 sest IBONMRA	1.5	100 envelops in 4 boxes	MP-2	Korieh	B-8	2005/06	Vitavax
	2 sets IBYTLRA_M	2.5	50 envelops in 2 boxes	MP-2	Korieh	B-8	2005/06	Vitavax
	4 sets IBYTMRA	2.5	50 envelops in 4 boxes	MP-2	Korieh	B-8	2005/06	Vitavax
Bread wheat	ANGI-4	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
	DAJAJ-5	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
	ABOUZIG-9	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
	BABAGA-3	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
	QIMMA-6	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
	HAAMA-11	10	1	MP-2	Yaljaroka	B8	2005/06	Vitavax
Faba bean	Aguadolce	400	8	MP-2	Laban	A21	2005/06	Vitavax
	ILB 1814	120	3	MP-2	Laban	A11	2005/06	Vitavax
Chickpea	FLIP 97-706c	24	1	SU/MP-2	Hamadeh	B-2	2004/05	Vitavax
Durum wheat	Baltagy-2	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Baltagy-1	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Younes-1	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Cham-5	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Ammar-1	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Ammar-3	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Ammar-6	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	ICASIR-2	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Fadda- 98	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Azeghar-2	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
	Lahaucan	10	1	SU/MP-2	Hamadeh	B8	2005/06	Vitavax
Vetch	*Vicia dasycarpa* 2562 (Kuhak)	250	5	SU/MP-2	Ryad	A7	2005/06	Vitavax
	Vicia sativa 2560 (local)	250	5	SU/MP-2	Ryad	A7	2005/06	Vitavax
	Lathyrus sativus 554 (Alibar)	50	1	SU/MP-2	Ryad	A7	2005/06	Vitavax
Total		1909	72					