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# Annual report

*project*

## Development of conservation cropping systems in the drylands of northern Iraq

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# 1 Progress summary

The project aims to increase crop productivity, profitability and sustainability in the drylands of northern Iraq through development, evaluation and promotion of conservation cropping technologies involving zero-tillage, stubble mulching, improved crop cultivars and better crop management. Project activity is focussed in Ninevah Governorate.

The objectives are:

1. To demonstrate and promote uptake of “best-bet” improved varieties and crop management systems for wheat, barley and pulse and forage legumes
2. To evaluate and select new, improved germplasm of wheat, barley and pulse and forage legumes for promotion in demonstration programs
3. To evaluate and select new, improved crop management technologies for promotion in demonstration programs
4. To facilitate agricultural planning and development through utilisation of GIS and crop modelling
5. To develop, evaluate and promote efficient and sustainable local seed production and supply systems
6. To monitor and evaluate adoption and impacts of project technologies, and identify enabling policy options to enhance uptake by farmers
7. To enhance capacity of Iraqi research and extension programs to develop and promote improved conservation cropping technologies.

The second project reporting/planning meeting was held at ICARDA on 27 September-1 October 2009, with 31 participants from Iraq, 3 from Australia and 15 from ICARDA. The Australian Ambassador and the First Secretary (Development Assistance) from the Australian Embassy in Baghdad attended and opened/closed the meeting. The Indian leader of the ACIAR project on enhancing wheat quality from the Directorate of Wheat Research in India also attended the meeting to share and discuss project experiences. Activities and achievements from 2008-09 were presented and the 2009-10 workplan developed and agreed.

In Ninevah, demonstrations of ZT, chisel cultivation and traditional cultivation with early/late planting using a local variety of barley, bread wheat, and durum wheat were established at 13 locations with 15 farmers. Lentil and chickpea were included at several sites. Rainfall (230-740mm) and harvests were good at 11 locations. Demonstrations covered 168 ha, with 56ha of ZT.

Three farmers grew 1025ha of ZT using their locally-modified Rama or John Shearer seeders. Thirteen farmers grew nearly 700ha of ZT crops using 3 Syrian 4m-wide trailed ZT tine seeders and one Syrian 4m-wide trailed ZT disc seeder. Overall, about 1800ha of ZT crops were grown by 31 farmers in Ninevah.

Field days were held in Ninevah at four demonstration sites. The first was arranged by farmers involved in ZT seeder modification at Nimroud on 20 February 10 (25 farmers-staff). Others were arranged by DOA at Mahalabia on 20 April 10 (31 farmers-staff), Telkief on 6 May 10 (42 farmers-staff) and Alshekhanon on 13 May 10 (80 farmers-staff).

In farmer demonstrations with collaborators in northern Syria, some 200- 250 farmers established about 8,000-10,000ha of ZT crop. Field days were held at Salamiya on 20 April (200 participants), Kamishley on 22 April (250) and Jarjanaz on 28 April (350).

Demonstrations and field days were used in training visits by Iraqi scientists and farmers, to inspect and discuss ZT activities with Syrian researchers, extension officers and

farmers. Many Iraqis initially sceptical about ZT, low seed rates and early planting were very positive by the end of their visits.

In Ninevah, 54 research trials were conducted under the germplasm and crop management research objectives. The University of Mosul and State Board of Agricultural Research Ninevah established 41 trials: 28 on evaluation of elite lines and varieties of wheat, barley, chickpea, lentil, vetch, lathyrus, saltbush, safflower, oats and peas; 13 on crop management involving mixtures, rotations, polymer gel, hardpan amelioration and IPM. Trials generally grew well with harvesting in May/June.

At ICARDA, 14 trials for technology refinement/verification and Iraqi scientist and farmer training were conducted on: crop and variety performance under ZT and CC; local seeder performance; time, seed rate and depth of sowing; comparison of local ZT seeders; evaluation of alternative crops (oilseeds, oats, peas); and increasing wheat frequency in wheat-lentil-camelina rotations. All trials established and grew well with 270mm of rain. Growth was consistently better from ZT than CC and early than late sowing. Locally-made ZT seeders performed well. Cereals and legumes seemed to do best when planted early with 100kg/ha of seed planted at 4-8cm depth. Trials were harvested in May/June.

Experience in 2008-09 with the first 3 local Syrian-made ZT seeders by farmers and researchers identified needs for stronger, wider, trailed or 3PL seeders with more-widely spaced tines and press wheels. Seven new models (10 units) were made 2009-10 in collaboration with El Bab, Qabbasin and Kamishley manufacturers. Four seeders were sent to Ninevah for evaluation and use in farmer demonstrations. These have worked well with several requiring some adjustment and strengthening.

In Ninevah, it was not possible to engage local manufacturers in ZT seeder fabrication. However, three local farmers, one the owner of the Nimroud demonstration site, continued innovative ZT modification and experimentation with local seeders, developing and testing robust and effective tines and narrow points in collaboration with Australian specialists. The farmers organised and funded a successful field day on 20 February attended by 25 farmers-scientists, showing and describing their positive experiences with ZT seeder modification and ZT crops. This farmer leadership in developing, testing, demonstrating and promoting modified ZT seeders is thought by project leaders to be a first for Ninevah/Iraq, and represents a major outcome and impact from the project.

There were major efforts in Ninevah to develop on-farm seed production. Foundation seed production of bread wheat, durum wheat and barley varieties was commenced at Rashidiya RS. Some 225ha of wheat (15 vars) and barley (4 vars) was grown in 10 locations by 21 seed production farmers; these will form the foundation of project-led village-based seed production enterprises.

In capacity enhancement at ICARDA, there were 77 Iraqi scientist and technician training visits with 47 participating in 12 formal training courses and 30 in the annual meeting where one Australian collaborator gave a seminar on adaptation to climate change. The training remained targeted, with Australian partners delivering 3 of the courses, and focused on specific areas related to the project: Socio-economic planning and evaluation; GIS landuse/cover mapping; Crop management and post harvest operations in quality seed production; ZT plot seeder assembly, operation and maintenance; Advanced design and analysis of experiments; Best practices for collecting and conserving genetic resources; Participatory extension; Iraqi farmers ZT study visit; Variety identification and maintenance; Data management, ANOVA, regression: Excel and Genstat; GIS/Remote sensing; ZT and agronomy research experience. In addition, 14 collaborating Syrian scientists also participated in some of these courses.

There were two very significant visits, one by 18 Iraqi and 14 Syrian farmers, and one by 16 Iraqi and 8 Syrian extension officers, to inspect and discuss ZT research, farmer experiences with ZT, and ZT seeder fabrication across northern Syria. The groups attended three major field days with 200-350 participants in Salamiya, Kamishley and

Jarjanaz. These visits greatly enhanced knowledge of ZT and effective ways to undertake participatory R, D and E with demonstrations and field days.

Seven trainees travelled to Australia on study visits focused on ZT, hay and seed production at UniAdelaide (3 participants), soil and plant nutrition at AgWA in Albany (1 participant), weed management at UniAdelaide (2 participants) and a PhD on conservation cropping at UniWA (1 participant).

During the year, project findings and research and demonstration trials were inspected and discussed with 175 farmers and staff at field days in Iraq. In Syria, 800 farmers and staff attended project field days in Salamiya, Idleb and Kamishley. At ICARDA, 100 Iraqi project staff and 300 visitors inspected and/or discussed project research trials. These visits exposed the project and ZT technology widely in the region and beyond. As an example, the Minister for Agriculture from Lebanon visited in mid-May 2010 and was surprised and impressed that crops could be grown with ZT and stubble retention; he has since requested specifications of project-developed ZT seeders and manufacturer details and plans to purchase seeders to promote ZT R&D in Lebanon.

The project generated considerable publicity and media coverage in Australia, with three articles published in development magazines and many reports in the rural press and on ABC radio and TV, including features on Late Night Live, Bush Telegraph and Landline. Detailed project information including project documents, reports and presentations is available through the ICARDA web site (<http://www.icarda.cgiar.org/ACIAR/Index.htm>).

Since ZT technology was first exposed and introduced into Iraq by the previous project in 2006-07, the known area of ZT crops has increased to 1,800ha in 2009-10. In project-related development in Syria where the technology was similarly little known or tested, total ZT area from project interactions was about 8,000-10,000ha in 2009-10. A further 700ha of ZT crops was grown in research and development projects involving Syrian research and extension groups. ICARDA grew about 200ha of ZT crops in trials and rotation/seed production areas. The on-going increase in awareness, research and development on the technology, the keen involvement of manufacturers and farmers in ZT seeder fabrication and testing and taking up ZT, and the higher yields and lower costs being experienced, provide a good foundation and confidence for wider adoption and impact. The more favourable year in 2009-10 has encouraged farmer enthusiasm and confidence in Ninevah and Syria.

## 2 Achievement against activities and outputs/milestones

### *Background*

The project was well established with stable staffing and procedures during the year. Field implementation in Iraq generally proceeded well in spite of severe insecurity and regular disruptions to local travel. Linked research and development activities and training in ICARDA proceeded smoothly. The major difficulty with implementation has been on-going delays with MOA nominations/approvals for Iraqi staff to travel to Australia for training.

### *Management*

The Ninevah Central Committee has not been active in 2008-09, despite efforts by the Ninevah Project Leader to initiate meetings. It is reportedly not easy or safe to gather regularly in Mosul. Meetings between institutions were through smaller irregular meetings and field visits, especially during major events such as distribution of ICARDA seed for planting, arrival of Syrian and Australian zero till seeders, and field days. There was good implementation of planned work by Ninevah institutions.

Dr Abdulsattar AIRijabo (project leader) had three formal meetings with;

- DOA staff on 8-9Oct10 to discuss the new plan for demonstrations
- project seed production team on 25-26Dec10 to discuss zoning for new, unreleased lines, select farmers and arrange project-farmer contracts
- DOA laboratory and GIS staff in May10 on procedures, arrangements and requirements for field sampling and obtaining GIS coordinates and landscape photos of demonstrations

Dr Saleh Bader (project coordinator) and Dr Saad Hatem Mohamed (socio-economics program leader) undertook a coordination visit to Ninevah in May and visited UniMosul, DOA and SBAR and discussed and inspected research, demonstration, seed production and socio-economic activities and budgets/expenditure. They attended the field day in Alshekhan on 15 May with Dr AIRijabo, Dr Kasim and Mr Seid.

Overall project coordination and communication amongst ICARDA, Iraqi institutions and Australian institutions was managed by email and, when necessary, telephone.

Whilst on leave in Australia, the ICARDA Project Leader Dr Colin Piggin, met with:

- 1) staff of ACIAR and AusAID in Canberra on 29 January 2010 to discuss project progress
- 2) Australian partners in Perth (Dr Kadambot Siddique, University of Western Australia), Albany (Dr Wal Anderson, Department of Agriculture) and Adelaide (Dr David Coventry, University of Adelaide) on 31 January to 11 February 2010 to discuss activities, progress and training plans. This included meetings with senior Executives of UWA (including Vice Chancellor Professor Alan Robson) and UniAdelaide and with University International Centres arranging the logistics of postgraduate training in Australia. In Albany, it involved interaction with an Iraqi trainee, Dr Saad Al-Malk from SBAR Ninevah, including attending his seminar and a visit to his experimental field site on the farm of Dr Terry Enright (ex-GRDC Board Chairman).

Dr Piggin made presentations on "Development and promotion of conservation cropping in Iraq and Syria" at ACIAR on 29 January to 25 staff/scientists from AusAID, DFAT, ACIAR, GRDC, CSIRO and the ABC and the UWA Institute of Agriculture on 2 February to over 70 people from within and outside the university. The seminars were well received and widely covered by the rural press and ABC.

High-level visits to ICARDA were made by Ambassador Robert Tyson and First Secretary (Development) Jonathan Ball from the Australian Embassy in Baghdad to participate in the ACIAR-AusAID Iraq project meeting on 27Sept-1Oct09. Jonathan Ball also visited on 8-9Mar10 to take part in meetings and discuss and inspect the project.

### **Implementation**

Outputs/milestones with completion dates and comments are tabled below for all activities under each objective:

#### **Objective 1: To demonstrate and promote uptake of “best-bet” improved varieties and crop management systems for wheat, barley and pulse and forage legumes**

<b>no.</b>	<b>activity</b>	<b>outputs/ milestones</b>	<b>completion date</b>	<b>comments</b>
1.1	Compile, review and analyse existing information on potential available technology options, (options already tested in the original project and more broadly within and outside Iraq, including registered Iraqi varieties of target crops and crop management options) in all agro-climatic zones of Ninevah governorate (All)	Annual Project meeting of project partners to discuss and determine work plan Constraint/limitations in rainfed crop production identified through evaluation of Phase 1 results/ experiences and on-going diagnostic study of farmers' existing practices Available “best bet” technologies identified-prioritized based on Phase 1 results/ experiences in farmer demos and research trials	Sept-Oct 09  Sept-Oct 09  Sept-Oct 09	Reporting/planning meeting held at ICARDA on 27Sept-1Oct09. 52 participants attended: SBAR Baghdad 3, SBAR Ninevah 6, DOA Ninevah 15, University of Mosul 6, Australia 3, ICARDA 15. The Australian Ambassador and First Sec (Dev), Baghdad Embassy, opened and closed the meeting. The Indian PL of the ACIAR wheat quality project attended to share experiences. The 09-10 demonstration workplan incorporating “best bet” technologies developed after considering constraints and year 1 results. A major advance was agreement to compare 'proven' technologies with farmer practice (ZT vs CC; early vs late sowing) and replicate treatments

1.2	Demonstrate and evaluate alternative conservation tillage management in Ninevah governorate, including zero-tillage, chisel plough, and deep tillage, compared with conventional tillage (PC)	<p>Annual Project meeting of all project partners to discuss and determine work plan</p> <p>Demonstration trials established</p> <p>Field days and visits to promote farmer awareness/adoption</p> <p>Evaluation of results and reporting</p>	<p>Sept 09</p> <p>Sept 09 -May 10</p> <p>Yr 1, 2, 3 on-going</p> <p>Yr 2, 3 m3</p>	<p>Workplan developed (see 1.1). Iraq</p> <p>In 13 locations (LRA-3, MRA-3, HRA-3, SI-4) involving 15 farmers, demos of ZT, chisel cultivation, traditional cultivation with early/late planting established in Nov-Jan. Local variety used with: barley in LRA-MRA; bread wheat in MRA-HRA-SI; durum wheat in HRA-SI. One lentil variety sown at Al Hamdania and 4 chickpea varieties at Al Qash. Demonstrations covered 168 ha, with 56ha of ZT</p> <p>Rains fell in Oct and totals (mm) to 31 May10 were: LRA (Tel Abta 157, Al Hatra 80, Al Mahalabia 305), MRA ( Bashyka 348, Tel Kief 397, Al Hamdania 230), HRA (Al Qash 400, Al Shekhan 742, Rabiaa 275), SI (Al Namrod 231, Al Mahalabiah 305, Al Shekhan 742, Al Qash 400).</p> <p>Three farmers grew 1025ha of ZT using their modified Rama or John Shearer seeders. 13 farmers grew 700ha of ZT crops using 4m-wide trailed ZT tine (3) or disc (1) seeders from Syria</p> <p>Overall, ≈1800ha of ZT crops grown by 31 farmers in Ninevah. Crops established well except in LRA; harvests were in May</p> <p>In Iraq, field days were held in Mahalabia 20Apr10 (31 farmers-staff), Telkief 6May10 (42) and Alshekhanon 13May10 (80 farmers-staff)</p> <p>ICARDA</p> <p>Linked farmer demos conducted in 7 locations in Syria with Dept Ext, GCSAR, Agha Khan Foundation, Syrian-Libyan Agric Company, seeder manufacturers, farmers. Program planned/agreed at ICARDA meeting (50 people) 6 Aug09. A local ZT seeder was based in each location and 20-40 farmers encouraged, without payment, to try ZT. ≈200-250 farmers grew ≈8,000-10,000 ha of ZT crop. Field days were held in Salamiya 20Apr10 (200 farmers-staff); Kamishley 22 April(250); Jarjanaz 28 April (350)</p> <p>Two Iraqi groups inspected demos and attended field days:</p> <p>a) 16 Iraqi ext-res staff and 8 Syrian GCSAR/Dept Ext staff attended Kamishley and Salamiya field days during particip ext training 19-23Apr10</p> <p>b) 18 Iraqi and 14 Syrian farmers attended Jarjanaz field day during a ZT study visit on 25-29Apr10</p>
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1.3	Identify, promote and widely disseminate among farmers in the rainfed cropping regions of Ninevah 'best bet' improved crop varieties identified in Phase 1 of the project (PC)	Annual meeting of all project partners to discuss and determine work plan Demonstration trials established  Field days and visits to promote farmer awareness/adoption  Evaluation of results and reporting	Sept 09  Sept 09-May10  April-May10 Yr 2, 3 on-going  Yr 2, 3 m3	13 demos focused on proven 'best bets' of ZT and early planting because past variety comparisons in large demo plots costly and showed no consistent differences for farmers.  No variety demos except at AlQash, where 4 chickpea lines were compared
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PC = partner country, A = Australia

**Objective 2: To evaluate and select new, improved germplasm of wheat, barley and pulse and forage legumes for promotion in demonstration programs**

no.	activity	outputs/ milestones	completion date	comments
2.1	Identify potential lines from the original project experience, other Iraq information, ICARDA's international testing program, Australian experience, and other sources (All)	ICARDA activity: identifying 10-12 elite lines of drought, disease and salinity tolerance ICARDA activity: incorporating abiotic/biotic stress tolerance/resistance into adapted lines	Nov09  On-going	Workplan determined (see 1.1) In Iraq, seed from 08-09 trials evaluating elite lines of bread wheat (10 lines), durum wheat (13), barley (14), chickpea (12), lentil (10), oats (10), peas (5), vetch (22), lathyrus (2), saltbush (2), safflower (23) saved. 32 ICARDA drought/disease nurseries for chickpea (5), faba bean (2), lentil (4), barley (9), durum wheat (4), bread wheat (8) sent to Ninevah in Dec09.

2.2	Screening, evaluation and selection of improved germplasm in Ninevah (PC)	Screening trials established Evaluation of results and reporting Field days and visits to promote farmer awareness/adoption Selected improved lines moved into activity 1.3 in demonstration program	Nov09-Jan010  Yr 2, 3 m 3  Yr 1, 2, 3 on-going  Yr 2,3 m4	Replicated YT/N by UniMosul and SBAR tested ICARDA, CIMMYT, Iraq lines. Many are selections of 'best' 08-09 elite lines Uni Mosul Sown 23Nov(at Uni unless stated) a) bread wheat (50 lines) b) durum wheat (120 lines) c) triticale (50 lines) d) barley (25) lines) e) barley (2 cvs), bread wheat (2 cvs), durum wheat (2 cvs) in large fields (1.25ha x 3 reps) in different rainfed locations SBAR Ninevah (RRS=Rasheediya Res Stn, MRA) a) bread wheat (5 lines) and 2 nurseries (24, 140 lines) sown 25Nov,10Jan RRS b) barley (6 lines) sown 16Dec RRS, 28Dec Telafer RS(LRA) c) lentil (10 lines) and 3 nurseries (25, 25, 36 lines) sown 25Nov, 10Jan RRS d) chickpea (13 lines) and 4 nurseries (31, 41, 45, 61 lines) sown 11Dec, 7Jan at RRS and 26Dec at Al Kosh (HRA) e) vetch (13 lines) sown 13Dec at Hamdania RS(MRA) f) vetch (7 lines) sown 10Jan at Hamdania RS(MRA) g) grasspea (16 lines) sown 10Jan at Hamdania RS(MRA) Rainfall (mm) 194 at Telafer RS (LRA), 304 at RRS (MRA), 221 at Al Hamdania RS (MRA), 382 at AlKosh (HRA) (see 1.2 for rainfall at other locations) Trials regularly evaluated for growth, pests, disease. Crops established well with most crops-locations. Harvesting May.
2.3	Screening, evaluation and selection of improved germplasm of wheat, barley, and forage legumes and grasses for adaptation to salinity in Iraq (PC)	Screening trials established Evaluation of results and reporting Field days and visits to promote farmer awareness/adoption	Nov08-May09 Yr 2, 3 m 5  Yr 2, 3 m 3  Yr 2, 3 on-going	Trials sown in Nov-Dec 09 at irrigated sites: a) Wahda, Baghdad Governorate - salinity (2 levels) with wheat and barley (4 vars each) b) Sawaria, Wassit Governorate - subsoiler (5 spacings) with 5 wheat vars - ZT and CC with wheat vars Trials grew well, harvest in May

**Objective 3: To evaluate and select new, improved crop management technologies for promotion in demonstration programs**

no.	activity	outputs/ milestones	completion date	comments
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3.1	Conduct research on conservation cropping technologies including ZT, stubble mulching, time of sowing, ± stubble, improved fertilizer practices, crop rotation, improved weed, pest and disease management in Iraq and ICARDA (PC and ICARDA)	<p>Annual meeting to discuss and determine work plan</p> <p>Trials established</p> <p>Field days and visits to promote farmer awareness/adoption</p> <p>Evaluation and reporting at annual meetings</p> <p>Selected improved technologies moved into activity 1.2 in demonstration program</p>	<p>Sept08</p> <p>Jan09</p> <p>Yr 1, 2, 3 on-going</p> <p>Yr 2, 3 m3</p> <p>Yr 2,3 m4</p>	<p>Workplan determined (see 1.1). Iraq UniMosul trials</p> <p>a) intercropping barley-saltbush with different row spacing in LRA</p> <p>b) annual medic field evaluation</p> <p>c) weed surveys at Nimroud, AlQash, TelKief, Mahalabia</p> <p>d) flax-wheat mixed cropping</p> <p>e) wheat-peas (3 vars each) with irrigation-polymer gel (3x3 levels)</p> <p>f) effect of row spacing (4) - polymer gel (3 levels) on rainfed bread wheat (Cham 8) in Nimroud</p> <p>g) effect of subsoiler type and spacing (2.5, 5m) in wheat and barley in TelKief</p> <p>h) IPM - planting methods and seed dressings for wheat leaf miner in wheat or lentil at Telkief</p> <p>i) IPM - biocontrol of covered smut and root rot in wheat under different tillage at Alqush</p> <p>Good May harvests expected for all crops-locations</p> <p>Syria - ICARDA</p> <p>a) 3 LT trials on CC vs ZT with cereals and food legumes with early/late planting and +/- stubble</p> <p>b) 2 trials on growth of 10 lines of cereals (BW, DW, barley, oats) and legumes (lentil, chickpea, faba bean, peas) under ZT vs CC</p> <p>c) 2 trials on seeding rate (50, 100, 150, 200, 300 kg/ha) and tillage (ZT vs CC) effect on estab-growth: cereals (BW, DW, barley) and legumes (lentil, chickpea)</p> <p>d) 1 trial on sowing depth (1.5, 4.5, 7.5, 10.5cm) effects under ZT on estab-growth of wheat/lentil</p> <p>e) 2 trials on planting time (5) effects on ZT wheat and lentil</p> <p>f) 1 LT ZT trial on increased wheat frequency +/- NP in wheat, lentil flax (<i>Camelina sativa</i>) rotations</p> <p>Rainfall 270mm; early conditions warm; severe frosts late Jan/early Feb; &lt;25mm after 1 Mar</p> <p>Generally, estab-growth better from early (Oct/Nov) than late (Dec/Jan) sowing and ZT than CC. Optimum seeding rates-depths ≈100kg/ha and 4-8cm.</p> <p>In LT trials, soil H<sub>2</sub>O higher for ZT than CC early but similar by maturity. ZT increased shallow SOM and macro-aggregates</p> <p>No trends in cyst nematodes in wheat, barley, chickpea, lentil</p> <p>Lentil tolerance to fusarium wilt and downy mildew differed for variety but not tillage x variety</p>
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3.2	Cross-evaluation of alternative cropping systems by crop-soil-simulation modelling (PC and ICARDA)	Small experiments conducted for later crop model calibration Selected trials analysed by crop simulation modelling to evaluate benefits of conservation cropping	Yr 1, 2, 3 m5  Yr 3 m3	Small side-experiment included in one LT trial in Nov09 and soil and crop parameters (soil water, Nmin, microbial biomass, aggregate stability, biomass, LAI) measured intensively.  Crop modelling will start when full-season data are available after June.
3.3	In conjunction with local manufacturers, modify and adapt locally produced seeders and evaluate their performance under ZT (PC and ICARDA)	Annual Project Reporting and Planning meeting to discuss and determine work plan Prototype ZT seeders produced, evaluated and promoted Evaluation of results and reporting at annual meetings	Sept08  On-going  Yr 2, 3 m3	ZT seeder fabrication workplan agreed (see 1.1) ICARDA-Syria Experience with first 3 local ZT seeders by farmers-researchers identified need for stronger, wider, trailed or 3PL seeders with press wheels (PW). Seven new models (10 units) made: i) 4m trailed tine+PW (Kamishley) ii) 4m trailed tine (Kamishley) iii) 4m trailed tine (Qabbasin) iv) 4m 3PL (El Bab) v) 4m disc (Kamishley) vi) 2.8m 3PL (Qabbasin) vii) 2.8m 3PL+PW (Kamishley) Costs: 2m ≈\$2000; 4m ≈\$5000 (tine) and ≈\$10,000 (disc) Four 4m seeders (3 tine+PW; 1 disc) sent to Ninevah Aug/Nov09 One trial conducted on barley establishment and yield when sown with 6 new local vs Indian and Amazone ZT seeders. New local seeders all performed well Iraq  Three innovative Ninevah farmers (Sinan Jalili, Yasser Fathi, Gazee Fatehi) continued ZT modification and experimentation with 2 Rama and 1 John Shearer local seeders. Sowing points developed and tested for soil throw and point wear. These farmers inspected and got ideas from various ZT tines/points sent from Australia to Iraq and ICARDA and interacted with Australian and ICARDA scientists by email and mobile. 1025ha of ZT crop sown with these 3seeders on 19Nov09. The farmers organised-funded a successful field day 20Feb10 with 20 farmers, A AIRijabo, Nimroud Agriculture, Ninevah DOA, showing and describing their positive experiences with seeder modification and ZT crops

3.4	Conduct research on adaptation and seed production of alternative crops including oats, peas and oilseeds in ICARDA and, when seed is available, in Iraq (PC and ICARDA)	Annual Reporting and Planning meeting to discuss and determine work plan  Trials established  Evaluation and reporting at annual meetings Field days and visits to promote farmer awareness/adoption Selected crops/ lines moved into activity 1.3 in demonstration program	Sept09  Nov-Dec09  Yr 2, 3 m3  Yr 1, 2, 3 on-going  Yr 2,3 m4	Workplan determined (see 1.1.) Oats (5 linesx10kg), peas (4 lines x10kg) sent to Iraq (see 2.1). ICARDA Trials conducted on oats and peas (see 3.1 ICARDA b). Both grew well. Brassicas estab poor and little seed harvested Iraq UniMosul Adaptation trials estab on peas (5 lines), oats (5), safflower (5) Establishment poor because of birds. Harvest expected in June
3.5	Evaluate systems for the integration of crops, forages and livestock (All)	Evaluation of literature and trials Reports and recommendations to annual meetings	Yr 2, 3 m3	Stubble retention/removal treatments continued in 09-10 wheat crop in one LT trial at ICARDA. This simulates effects of grazing on crops and soils
3.6	Undertake initial demonstrations with farmers in Iraq and ICARDA/Syria and identify options for wider promotion under Objective 1 (PC and ICARDA)	Establishment of demonstrations with farmers in Iraq and around ICARDA	Nov09-Jan10	ZT demonstrations established with 31 farmers over 1500ha in Iraq and ≈200-250 farmers and ≈8,000-10,000ha in northern Syria (see 1.2 and 1.3 for details).

#### **Objective 4: To facilitate agricultural planning and development through utilisation of GIS and crop modelling**

no.	activity	outputs/ milestones	completion date	comments
4.1	Conduct annual training session on advanced GIS skills (ICARDA)	2-3 trained GIS scientists	May09	3 DOA GIS scientists undertook training on land use/cover mapping on 4-8 Oct 09 and GIS/RS on 16-27 May 10
4.2	Develop land suitability maps using locally compiled and globally available data (PC and ICARDA)	Land suitability maps developed and used in planning and technology dissemination	Yr 3, m12	Targeted for 2011
4.3	Integrate GIS into project development activities and develop and utilize geospatial services to assist with the interpretation and promotion of project technologies (PC)	New GIS skills being applied in DOA Ninevah GIS Unit	On-going	Trainees in GIS courses using better skills and understanding. They produced initial maps on land and rainfall suitability to assist in evaluation and reporting of Ninevah R & D activities at the 2009 annual meeting. Shows benefit of nominating same specialists in advancing courses

4.4	Initiate training sessions in crop-soil simulation modelling using either the CropSyst, APSIM or DSSAT crop modelling suite (ICARDA)	2-3 scientists trained in modelling  Crop models increasingly used in evaluation of conservation cropping	Yr 2 m12  On-going	Training in and use of crop-soil modelling has been dropped from activities due to lack of relevance, interest and suitable trainees from Iraq
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**Objective 5: To develop, evaluate and promote efficient and sustainable local seed production and supply systems**

no.	activity	outputs/ milestones	completion date	comments
5.1	Multiply and provide seed of new crop germplasm and crop varieties for research and demonstration in Iraq (ICARDA)	1-2 tonnes of seed of new germplasm and varieties of cereals, legumes and forages produced at ICARDA and made available for research and demonstration in Iraq	Sept - Nov 09	Seed from ICARDA (18.81t) to support trials, demonstrations and seed production in Iraq assembled and sent to Mosul arriving 29Dec09
5.2	Develop a functional seed unit for breeder and foundation seed production at Rashidiya research station in Ninevah using the seed cleaners purchased in the original project (PC)	Appropriate procedures and facilities for breeder and basic seed production reviewed during first year and established during the second year  At least 10 participants trained each year in variety maintenance and breeder/foundation seed production	Nov-Dec 09  May10	Under SBAR, spike rows (4552) of wheat (4 vars) and barley (2 vars) for breeder (nucleus) seed production grown at Rashidiya RS (sown 15 Nov 09) and Hamdania RS (sown 8 Dec 09) Bread (4 vars) and durum (4 vars) wheat and barley (2 vars), grown at Al-Hamdania RS (250m <sup>2</sup> ) and Al-Rashidiya RS (200-600m <sup>2</sup> ) for basic seed production Common vetch (IPA2001 - 10kgs) and chickpea (Ghab-5 - 20kg) grown at Rashidiya RS and grasspea (Sel #587 - 15kg) grown at Al-Hamdania RS and Rashidiya RS to multiply seed Four Iraqi participants from Ninevah (Qahtan Ibrihim, SBSTC; Eesam Saeed, SBSTC; Abdullah Ahmed, SBAR; Niama Darweesh, UniMosul) attended training on variety identification-maintenance in seed production on 2-25 May10

5.3	Establish sustainable farm/village-based seed production enterprises (VBSEs) (PC)	<p>Four VBSEs operational during Yr1 each producing 100 t seed</p> <p>An additional 4/5 VBSEs operational during Yr2 each producing 100 t seed</p> <p>Group training for farmers, extension services and other stakeholders organized each yr on technical and management aspects</p> <p>Seed demand survey conducted and business plans developed each yr</p> <p>Analysis of profitability of VBSEs conducted each yr to ensure sustainability and options for diversification</p> <p>Network/association of local seed production and marketing enterprises established at provincial level during Yr3</p>	<p>Yr 1 m12</p> <p>Yr 2 m12</p> <p>Yr 1,2,3 m12</p> <p>Yr 1,2,3 m12</p> <p>Yr 1,2,3 m12</p> <p>Yr 3 m12</p>	<p>Year 1 targets not achieved due to droughts in 07-08 and 08-09, which delayed many Yr 2 plans. Concerns about 'non-official' nature of VBSE, though ≈90% of seed transfer is farmer to farmer trade, also limited progress</p> <p>Qahtan Saeid Ibrihim, SBSTC, was designated MOA focal person for seed objective in 2009. Progress, responsibilities and plans for VBSE were discussed at ICARDA with Qahtan, Eesam Saeed, SBSTC, Abdullah Ahmed SBAR and Niama Darweesh UniMosul during variety identification-maintenance training on 2-25 May10</p> <p>Survey of farmer seed prodn conducted by socio-economic team completed - sent to ICARDA Sept09 (see Activity 6.1) To be presented at Sept10 meeting</p> <p>There were major efforts by DOA and UniMosul to develop on-farm seed production together with 21 farmers on 225ha as follows:</p> <p>DOA with 6 seed growers, 110ha of foundation, registered and certified seed of wheat (9 vars) and barley (1 var) grown on 10 fields under HRA/SI at Al Kosh, Tel Kief, Al Shykan</p> <p>UniMosul with 15 seed growers, 114ha of bread wheat (3 vars), durum wheat (3 var) and barley (3 vars) grown under both SI and HRA/MRA in 41 fields in Bashiqa, Tel Kief, Wana, TelAffer, Yaremja, Nimroud-Khuther, Hamdaniya, Al Shykan, Al Nimroud</p> <p>These 21 seed growers will form the basis of VBSE for Yr3 development and evaluation</p>
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**Objective 6: To monitor and evaluate adoption and impacts of project technologies, and identify enabling policy options to enhance uptake by farmers**

no.	activity	outputs/ milestones	completion date	comments
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6.1	Characterization of improved technology options in terms of their performance, profitability, risk reduction, and acceptance by farmers (PC)	Yields and agronomic performance estimates, budgets and results of sensitivity analysis, farmer perceptions documented and used in evaluation and planning	May10	<p>Severe droughts in 07-08 and 08-09 caused crop failure in Ninevah and limited socioeconomic progress but there was good preparation for surveys to capture required farmer data to support the 8 activities in Obj 6</p> <p>The socio-economic team (SBAR Baghdad: Saad Mohamed, Wathiq Abdullah; DOA Mosul: Bassam Qasim; MosulUni Salim Al-Niaamy, Emad Ismaeel ; SBAR Nineveh Mahdi Kheder; ICARDA Simeon Kaitibie) met at ICARDA on 26-29July09m and at annual meeting on 27Sept-1Oct09 to review progress and plan 09-10 farmer and seed prodn surveys</p> <p>With better rainfall in 09-10, surveys of 336 of a planned 500 farmers completed by May10, 53 in SI areas by a female MSc student (Supervisor: Dr Salim Al-Niaamy). Surveys including harvest data for all farmers will be completed, analysed, reported for annual meeting Sept10</p> <p>The Iraqi socio-economic team met in Mosul in May10 to discuss progress, visit farms, monitor project progress and farmer experiences, and attend a field day on 13May10 at Alshekhan at Shaker Ibrahim's farm in Beajy</p> <p>There are some indications of initial impact. During the survey and field day, farmers involved in demonstrations impressed by:</p> <ul style="list-style-type: none"> <li>a) lower production costs and expected increased productivity of ZT versus local practices</li> <li>b) uptake of project options such as ZT and new varieties by farmers not involved in the project</li> <li>c) local modification of traditional seeders by farmers to address a main constraint to ZT adoption which is availability of ZT seeders</li> </ul> <p>Quantitative results of impacts will be presented in the Sept10 meeting.</p>
6.2	Analysis of water productivity and factors explaining low WUE in SI areas and farmer's demand for water (PC)	Water-related productivity and demand indicators	Yr 2 m12	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah
6.3	Identify sources of inefficiency and assess the impacts of improved options on increasing efficiency (PC)	Options for improving production inefficiency identified	Yr 2 m12	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah

6.4	Assess the effectiveness of improved management options on the adaptive capacity of local communities to climatic variability and change (PC)	Best-bet technology options for adaptation to climatic risk identified	Yr 3 m6	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah
6.5	Monitoring rate of adoption of improved technologies and identifying constraints to provide feedback to technical, socio-economic and policy research (PC)	Adoption indicators, constraints identified and shared with others	Yr 2 m12	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah
6.6	Evaluation of economic and environmental impacts of improved technologies promoted by the project at both farm and community levels (PC)	Estimates of impact documented	Yr 2 m12	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah
6.7	Assess the impact of land tenure, input and output pricing policies (input price subsidy, output price supports) on the uptake of new technologies and their implications on rural livelihoods (PC)	Land tenure and pricing policy options developed	Yr 2 m12	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah
6.8	Identify enabling policy and institutional options (PC and ICARDA)	Enabling institutional arrangements and policy incentives and options identified	Yr 3 m6	To be conducted in 2010-11 provided data from demos/trials collected and security situation allows surveys in Ninevah

**Objective 7: To enhance capacity of Iraqi research and extension programs to develop and promote improved conservation cropping technologies**

no.	activity	outputs/ milestones	completion date	comments
7.1	Develop and agree on program of training (All)	Annual training program	Oct09	Possible topics/areas for short-term training at ICARDA and medium and post-graduate training in Australia discussed and agreed at annual meeting

7.2	Short term and individual medium-term training and joint data analysis (ICARDA)	Training conducted (25 trainees per year)	Sept09 - May10	<p>Twelve training courses/visits undertaken involving 105 trainees (47 scientists and 18 farmers from Iraq; 14 GCSAR/DofE scientists and 14 farmers from Syria; 2 technicians from Libya; and 10 ICARDA scientists) on:</p> <ol style="list-style-type: none"> <li>1. socio-economic planning and evaluation, 26-28July09 - 6 Iraqi participants (Organiser: S Kaitibie ICARDA)</li> <li>2. GIS landuse/cover mapping, 4-8Oct09 - 3 Iraqi participants (Presenter: W Wu ICARDA)</li> <li>3. Crop management and post harvest operations in quality seed production, 27Sept-8 Oct - 1 Iraqi participant (Presenters: A Niane, Z Bishaw, A Madarati, ICARDA)</li> <li>4. ZT plot seeder assembly, operation and maintenance, 25-29Oct09 - 3 Iraqi, 4 ICARDA participants (Presenter: C Warner, Warner Engineering, S Australia)</li> <li>5. Advanced design and analysis of experiments, 8-19Nov09 - 1 Iraqi participant (Presenter: K El-Sham'aa ICARDA)</li> <li>6. Best practices for collecting and conserving genetic resources, 18-30April10 - 1 Iraqi participant (Presenters: Genetic Resources Section ICARDA)</li> <li>7. Participatory extension, 19-23April10 - 16 Iraqi, 6 Syrian, 1 ICARDA participants (Presenters: J Fortune, M Wurst, UniAdelaide-SARDI; C Piggin, A Haddad, N Trabulsi ICARDA)</li> <li>8. Iraqi farmers ZT study visit, 25-29April10 - 18 Iraqi, 14 Syrian, 2 Libyan, 2 ICARDA participants (Presenters: C Piggin, A Haddad, N Trabulsi, Y Khalil ICARDA)</li> <li>9. Variety identification and maintenance, 2-20May10 - 4 Iraqi participants (Presenters: A Niane, Z Bishaw, A Madarati, ICARDA)</li> <li>10. Data management, ANOVA, regression: Excel and Genstat, 4-13May10 - 9 Iraqi, 3 Syrian, 4 ICARDA participants (Presenter: J Berger, CSIRO-UniWA)</li> <li>11. GIS/Remote sensing, 16-27May10 - 3 Iraqi participants (Presenter: E De Pauw ICARDA)</li> <li>12. ZT and agronomy research experience, 16May-30June10 - 3 Syrian collaborators (Organisers: A Haddad, C Piggin ICARDA)</li> </ol>
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7.3	Thematic workshops (ICARDA)	New research areas identified, or work plans adjusted; new methodologies adopted	Sept09  Yr 3 m3	Seminar attended by 31 Iraqi and 20 ICARDA scientists presented at Sept-Oct08 annual meeting by Dr K Siddique UniWA on "Climate Change: Can we adapt crops and farming systems?"
7.4	Long term training/joint research and English/MSc/PhD graduate research at Australian partner institutes (A)	10 Iraqi scientists trained over 3 years  4 MSc graduates  2 PhD graduates	Yr 1, 2,3 m12  Yr 3 m12  Yr 5 (2013) m12	Implementation has been slow. It has been difficult to get timely nominations with adequate supporting documentation. There have also been inordinate and on-going delays with MOA approval for selected nominees to travel. After 2 years, only seven Iraqis have gone to Australia for training, all in 09-10, as follows: Study visits: 1. Dr Saad Samir UniMosul; Mr Jaafar Saeed, DOA; Dr Kasim Khalil, SBAR, on ZT, hay and seed production in S Aust/Vic, 3-29Oct09 (UniAdelaide support) 2. Dr Saad Almalk, SBAR, on soil science at Albany WA, 18Oct09 - 26 Mar10 (AgWA support) 3. Dr Ahmed Sultan UniMosul on weed science, 14May-15Oct10 (UniAdelaide support) 4. Dr Salim Anter UniMosul on weed science, 14May-15Oct10 (UniAdelaide support) Post graduate study 1. Mohammed Ameen Haji UniMosul, on a conservation cropping PhD, 4June10-June14 (UniWA support) The Australian training program for Iraqi scientists is requiring an inordinate amount of time and organization for ICARDA and Australian partners and will need review if MOA approval delays continue (see details under 8).
7.5	Support participation of Iraqi personnel in regional or international workshops and conferences of relevance to the project (All)	Conference attendance and report	Oct09 May-June10	The project supported scientists to attend conferences (paper-poster presentations), training, meetings: 1) Dr. Suaad Irdeny Abdullah, UniMosul to 10th Arab Conf on Plant Prot, Lebanon, 26-30Oct09 2) Dr Omran Youssef, GCSAR, Kamishley, Syria, to Borlaug Global Rust Meeting/8th Int Wheat Conf, Russia, 30May-5June10 3) Dr Khalid Hassan Taha, UniMosul to CIMMYT-ICARDA-Crawford Fund 4th Master Class on Soil Borne Pathogens in Wheat, Turkey, 20June-3Jul10 4) 10 Ninevah and 2 ICARDA scientists to Food Legume Review meeting, Erbil, Iraq 10-11June10

PC = partner country, A = Australia, ICARDA = International Center for Research in Dry Areas

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## 3 Impacts

This project follows on from an initial 3-year project, with both aimed at introducing, developing and promoting new cropping technologies in a difficult environment, which needs time. In the initial project, as discussed in the 2008 final report, adoption and impact prospects were considered promising but had been constrained by the facts that ZT seeders were unavailable in the first year and severe drought caused crop failure in nearly all research and demonstration sites in the third year. In the first year of the new project, as discussed in the 2009 annual report, rainfall was also very low in Ninevah and crops failed in most locations. The 2009-10 rainfall has been good in Ninevah and reasonable in ICARDA and surrounds. Harvest was underway in May, with prospects for good yields.

Cost-benefit and adoption/impact evaluations will be undertaken after crops are harvested this year and in 2010-11. Some positive impact-related experiences were reported for 2008-09 and more for 2009-10 are discussed below.

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### 3.1 Scientific impacts

The project has continued to develop considerable knowledge and experience of conservation cropping technologies in Iraq and Syria through R&D on ZT, ZT seeder fabrication and alternative crops. The consistent findings across years and crops that ZT is productive and profitable, early sowing increases yields, and seeding rates can be reduced to 100kg/ha or less, are significant advances in the region. The experience that affordable and effective ZT seeders can be fabricated locally removes a significant and commonly-reported constraint to ZT adoption. Comparisons barley, bread and durum wheat, chickpea and lentil lines under CC and ZT at ICARDA, indicating present varieties-lines are well-adapted to ZT, dispels concerns that new breeding programs and outputs might be needed before the technology can be adopted widely and also contribute unique information to any future review of germplasm evaluation methodologies in the region.

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### 3.2 Capacity impacts

There were 77 Iraqi scientist training visits to ICARDA with 47 participating in 12 formal training courses and 30 participating in the reporting-planning-scientific exchange meeting, where one Australian collaborator delivered a seminar on "Climate Change: Can we adapt crops and farming systems?"

The ICARDA training for the 47 Iraqi scientists, with Australian partners delivering 3 of the courses, remained targeted and focused on specific areas related to the project: Socio-economic planning and evaluation; GIS landuse/cover mapping; Crop management and post harvest operations in quality seed production; ZT plot seeder assembly, operation and maintenance; Advanced design and analysis of experiments; Best practices for collecting and conserving genetic resources; Participatory extension; Iraqi farmers ZT study visit; Variety identification and maintenance; Data management, ANOVA, regression: Excel and Genstat; GIS/Remote sensing; ZT and agronomy research experience. In addition, 14 collaborating Syrian scientists also participated in some of these courses.

Capability to plan and implement programs to identify, demonstrate and disseminate new technologies, especially related to conservation cropping, was enhanced for the 30 scientists who attended the annual meeting through involvement in planning, conducting and reporting of research and demonstration activities. They have received good guidance from ICARDA and Australian scientists but, because of their isolated situation, have been completely responsible along with colleagues for project implementation. This has encouraged experience and capacity in planning, organisation, communication and innovation.

There were two very significant training visits, one by 18 Iraqi and 14 Syrian farmers, and one by 16 Iraqi and 8 Syrian extension officers, which inspected and discussed ZT research at ICARDA and the GCSAR Research Station in Kamishley, farmer experiences with ZT testing around Aleppo, El Bab, Idleb, Salamiya and Kamishley, and ZT seeder fabrication with 4 machinery manufacturers in ElBab, Qabbasin and Kamishley. The groups also attended three major field days which were held at ZT vs CC sites in Salamiya Research Station with 200 participants on 20 April and on farms at Kamishley with 250 participants on 22 April and Jarjanaz with 350 participants on 28 April 10.

Five Iraqi farmers from the visiting farmer group, involved in ZT seeder modification, also had an added half-day of training at ICARDA with demonstrations and discussions on various fixed and trailed ZT tines, points, discs and press wheels, sent by Dr J Desbiolles, which gave them lots of ideas to test in future modifications and enhancements in Iraq

These visits greatly enhanced farmer and extension officer knowledge of ZT/stubble retention sowing systems and reinforced commitment to try these on a large scale. They also showed and discussed effective ways to undertake participatory R, D and E and use demonstrations and field days to promote awareness, experience and adoption of ZT technology.

Capacity of Iraqi institutions to undertake work was enhanced with the supply of ZT seeders as follows:

- a) one 4-m trailed Baldan-type triple-disc seeder for broad-acre sowing manufactured in Kamishley and received 11 Aug 09
- b) three 4-m trailed ZT seeders for broad-acre sowing manufactured in Kamishley and received 24 Nov 09
- c) one ZT plot seeder for plant breeding and agronomy research manufactured in Australia and received 10 Feb 10

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### 3.3 Community impacts

Farmers in Iraq and Syria, like farmers everywhere, are very interested in ZT/stubble mulching to increase yields, reduce costs and improve soil and water conservation.

In Iraq, farmers involved in the project demonstrations or who visited ICARDA in 2008-09 grew significant areas of their crop under ZT and influenced many neighbours to take an interest and try ZT in 2009-10. Three farmers involved in ZT modification interacted with ICARDA and Dr J Desbiolles in Australia and continued to experiment with and improve their Rama/John Shearer seeders.

In Syria, the number of farmers collaborating with ICARDA, GCSAR, Dept Extension and NGOs in on-farm testing/demonstration of ZT/stubble mulching increased greatly, and most were impressed with the simplicity, good yields and lower costs of the ZT system.

The four machinery manufacturers involved in local development of ZT seeders see the potential of the technology, as many are farmers, and possibilities to increase business as demand and adoption grow. They are pioneers for ZT, proposing it as an alternative for any farmers seeking to purchase a new seeder.

#### 3.3.1 Economic impacts

In Ninevah, interest in ZT/stubble mulching has continued to grow. In 2008-09, ZT crops covered some 52ha in project demonstrations on farmer fields. Six farmers grew a further 440ha of ZT crops using a modified Rama seeder. Total ZT area we knew of was 490ha.

In 2009-10, project demonstrations covered 168 ha, with 56ha of ZT. In addition, 3 farmers established 1025ha of ZT crops using their own modified Rama or John Shearer ZT seeders. A further 9 farmers established 293ha of ZT crops using 3 Syrian-made 4m-

wide trailed ZT tine seeders and 4 farmers established 400ha of ZT crops using a Syrian-made 4m ZT disc seeder. Overall, a total of about 1800ha of ZT crops was sown by 31 farmers.

In project-linked development in Syria in 2008-09, 43 farmers grew 2075ha with ZT. There was also 52ha of ZT research plots and rotation crops at ICARDA. The ZT area linked to project interactions totalled about 2127ha.

In 2009-10, farmer areas expanded greatly under a major extension program implemented with Syrian research, extension and NGO groups with about 200-250 farmers growing about 8,000-10,000ha (surveys of farmers, areas and production are still underway). There are about 250ha of ZT research and rotation/seed production crops in ICARDA in 2009-10. Overall, the ZT area linked to project interactions may total about 10,000ha.

Economic benefits will come from higher yields and lower costs. In long-term trials at ICARDA in 2007-08 (220mm) and 2008-09 (290mm) respectively, yields with improved management (ZT and early sowing) were higher than for farmer practice (2 cultivations and late sowing) by 54% and 20% (260 and 270kg/ha) for wheat, 56% and 84% (215 and 320kg/ha) for chickpea, 46-92% and 13% (190-615 and 130 kg/ha) for lentil and 14% and 12-20% (195 and 390-420kg/ha) for barley. With ZT, costs can be reduced because cultivation is eliminated and sowing rates, often around 300kg/ha in the region, can be reduced to 100kg/ha. Other costs will not change much as the dry Mediterranean summers mean few weeds and only occasional need for pre-sowing herbicides such as Glyphosate, whilst post-sowing crop management is similar for both systems.

The 2009-10 uptake by farmers of ZT over  $\approx$ 1800ha in Iraq and  $\approx$ 10,000ha in Syria is a project outcome. It is not unreasonable based on project experience to estimate that farmers growing wheat may get an extra 20% of yield (say 250kg of wheat = US\$100/ha), save 2 cultivations (say \$40/ha) and reduce sowing rate from the commonly-used 300 to 100kg/ha, a saving of 200kg/ha or about \$80/ha. Total impact (net return) may be \$220/ha. In 2009-10, economic return could have been \$396,000 over 1800ha for Iraq and \$2,200,000 over 10,000ha for Syria. Overall, it could have been \$2,596,000 over 11800ha. It would be much higher with bigger yield responses and/or higher value pulse crops. It will be much bigger as areas expand.

In Iraq, there are no other projects developing and promoting ZT, according to our project collaborators. In Syria, there are several other projects evaluating and promoting ZT. GCSAR, with support from the Arab Agency for Agricultural International Development (AAID) commenced a project in 2004 on the development and promotion of ZT in Hassake Province. This project reportedly had 60ha of trials and on-farm demonstrations in 2008-09. The financial support has finished but GCSAR through Himo and Hassake Research Stations has continued long-term ZT rotation trials and on-farm demonstrations in expanded collaboration with the ACIAR-AusAID project. The Arab Center for Studies of Arid Zones (ACSAD), together with the Syrian Directorate of Extension and GCSAR, initiated a conservation agriculture project in 2006 with GTZ support. This commenced field trials/demonstrations in 2007-08 and reported growing more than 700ha under conservation agriculture in 2009-10. Both these projects have expanded awareness and experience of conservation agriculture in Syria but adoption has been constrained by the use of expensive, imported ZT seeders.

In Ninevah, three innovative farmers, following a visit to ICARDA in January 2007, developed a major farmer-led program experimenting with ZT modification of their own seeders. They organised and funded a successful field day on 20Feb10 attended by 25 farmers and scientists, displaying and describing their positive experiences with ZT seeder modification and crops. This farmer leadership in developing, testing demonstrating and promoting modified ZT seeders is thought by project leaders to be a first for Ninevah/Iraq, and represents a major outcome and impact from the project.

In Syria, the four collaborating machinery manufacturers produced their first three ZT seeders in 2008/09. Experience with these by farmers and researchers identified a need for stronger, wider, trailed or 3PL seeders with press wheels. Seven new 2m and 4m models (10 units) with these advances were made in 2009-10. These have worked well in research and farmer fields. Four were sent to Iraq and the others used in the 7 major zones in the Syrian ZT extension program.

Three of the new 2-m and 4-m ZT seeders were displayed in the ICARDA booth at the 18-20Oct10 Agricultural Exhibition in Damascus, under the supervision of ICARDA and manufacturers. The Minister for Agriculture and many farmers visited the booth and discussed ZT and the seeders, with the Minister agreeing to include ZT seeders in the MOA credit scheme for small farmers, which should give ZT adoption a boost. A project outcome emerged when the manufacturers displayed independently prepared technical brochures explaining the ZT seeders and business cards describing themselves as "ZT seeder manufacturers."

In a 2009-10 project impact, the El Bab and Qabbasin manufacturers have sold six ZT seeders (2m 3PL) to local Syrian farmers at a price of about \$1500 per seeder in 2009-10. We know of a further 14 farmers in Syria who are purchasing 2m 3PL (7), 4m 3PL (1) and 4m trailed (6) ZT seeders for the 2010-11 season.

This initial farmer uptake of ZT, involvement of local manufacturers in ZT seeder construction and sale, and higher yields and lower costs provide a good foundation for wider adoption and impact in Iraq and Syria.

### 3.3.2 Social impacts

The reductions in cultivation and quicker, earlier sowing of crops possible with ZT will bring more time and leisure to farmers and more family opportunity for interaction and recreation. Human health may be enhanced with no requirement for stubble burning and consequently less smoke pollution and also with reductions in dust storms, which are common in the region. These are predicted impacts which may be realised if/when ZT is more widely adopted.

### 3.3.3 Environmental impacts

Environmental benefits to soils and water can be expected in future. From experience elsewhere, ZT brings better soil structure (OM), better soil-water dynamics (porosity), better nutrient recycling (NPK), improved trafficability, less erosion, and opportunity for increased soil OM and C sequestration. Soil testing from the long-term trials at ICARDA suggests that after 4 years the percentage of aggregates with a size >0.5 mm is higher under ZT than conventional cultivation but there are no OM changes to date. Pollution will also be less as stubbles are retained on the soil surface and burning is reduced. Dust storms and erosion, which can be severe in the region, should be reduced. These benefits have not been quantified but are well known from other experiences and publications.

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## 3.4 Communication and dissemination activities

**Project Website** - this allows access by project partners to the latest project documents and selected presentations given at meetings, for reference and re-use. The website is open to the public and provides information to the wider scientific community and donors on research, development and capacity building by the project in Iraq and Syria.

### **Project reports and publications:**

Annual project report 2008-09, ACIAR/AusAID CIM/2008/027, Development of conservation cropping systems in the drylands of northern Iraq. 33pp.

Piggin, C. (2009). Improving agriculture with zero tillage cropping systems in Iraq. *Issues* 89: 11-13

Piggin, C. (2009). Minimum Tillage, Maximum Benefits. *Caravan* 26: 19-21.

Braidotti, G. (2009). Tilling new knowledge. *Partners in Research and Development*, July-October 2009, p14-15.

Ahmed, S, C. Piggin, A Haddad, S Kumar, B Geletu (2009). Reactions to fusarium wilt under zero and conventional tillage systems. Poster presented to the 5th International Food Legume Research Conference and 7th European Conference on Grain Legumes. Antalya, Turkey 26-30 April 2010.

### **Publicity in Australian media**

The ACIAR-AusAID Iraq Project has created a lot of interest in Australia. Colin Piggin gave many media interviews and two seminars to Australian media and institutions in 09-10. Several interviews were from ICARDA Syria but most were whilst in Australia in Jan-Feb 10, interacting with ACIAR and AusAID and collaborators at UniWA in Perth, AgWA in Albany and UniAdelaide.

These are listed (with links) below, many organised by Cathy Reade of the Crawford Fund and Mandy Gyles of ACIAR:

6.4.09

ABC Rural and other ABC stations - Helping farmers help themselves

<http://www.abc.net.au/rural/content/2008/s2532337.htm>

20.10.09

ABC SBS Radio World View AM Program - Improving cropping in northern Iraq

<http://www.sbs.com.au/podcasts/naca/world-view/> (page 27)

22.10.09

ABC Late Night Live - Sir John Crawford and Australia's International Agricultural Research

<http://www.abc.net.au/rn/latenightlive/stories/2009/2721424.htm>

26.1.10

Interview with Phil Kascaloudes, Radio Australia, Today Program

29.1.10

ACIAR - seminar on "Improving dryland crop production in Iraq"

2.2.10

UniWA - seminar on "Improving dryland crop production in Iraq"

[http://www.ioa.uwa.edu.au/papers/food\\_and\\_agriculture\\_lectures/2010](http://www.ioa.uwa.edu.au/papers/food_and_agriculture_lectures/2010)

28.1.10

Radio Australia Connect Asia <http://www.radioaustralia.net.au/connectasia/stories/201001/s2803709.htm>

6.2.10

Rural Press (print and online):

- Stock and Land

<http://sl.farmonline.com.au/news/nationalrural/grains-and-cropping/general/taking-notill-to-the-middle-east/1741477.aspx>

- Queensland Country Life

<http://qcl.farmonline.com.au/newssearch.aspx?cmd=run&q=colin+piggin&au=gregor+heard&sb=displaydate&so=asc&sf=9&cf=203&scf=>

- The Land

<http://theland.farmonline.com.au/newssearch.aspx?cmd=run&q=colin+piggin&au=gregor+heard&sb=displaydate&so=asc&sf=9&cf=203&scf=>

- Farm Weekly

<http://fw.farmonline.com.au/newssearch.aspx?cmd=run&q=colin+piggin&au=gregor+heard&sb=displaydate&so=asc&sf=9&cf=203&scf=>

- Stock Journal <http://sj.farmonline.com.au/news/nationalrural/grains-and-cropping/general/taking-notill-to-the-middle-east/1741477.aspx>

- North Qld Register <http://nqr.farmonline.com.au/news/nationalrural/grains-and-cropping/general/taking-notill-to-the-middle-east/1741477.aspx>

8.2.10

ABC Country Hour NSW/ACT

<http://www.abc.net.au/rural/regions/content/2007/s2812672.htm>

8.2.10 (broadcast 18/4/10)

ABC TV Landline - The ACIAR-AusAID Iraq Project: interview with Sarina Locke  
<http://www.abc.net.au/landline/content/2010/s2875852.htm>

10.2.10

National Community Radio "Wire"

<http://www.thewire.org.au/daydetail.aspx?SearchDay=2010-02-10>

11.2.10

ABC RN Bush Telegraph

<http://www.abc.net.au/rural/telegraph/content/2010/s2816652.htm>

22.2.10

ABC SA Country Hour

<http://www.abc.net.au/rural/sa/content/2010/02/s2826775.htm> (audio)

<http://www.abc.net.au/rural/sa/content/2010/02/s2826851.htm> (written)

## **Ninevah, Iraq**

Some 175 Iraqi farmers and agricultural staff attended four field days on conservation cropping. Three DOA field days were held on demonstration and research locations at: Mahalabia on 20Apr10 (31 farmers/staff); Telkief on 6May10 (42 farmers/staff including J Seid and A S AIRijabo); Alshekhan on 13May10 (80 farmers/staff including S Bader, A S AIRijabo, S H Mohamad, K Kassim, J S Seid).

In a very significant development, because farmers have not organised and funded a research project and field day in Ninevah or Iraq before according to project collaborators, 3 Ninevah farmers working on ZT modification of local seeders (Sinan Jalili, Yasser Fathi, Gazee Fatehi) organised and held a field day at Al Nimroud on 20Feb10. This was attended by 20 farmers and A S AIRijabo, Abdul Al Monem M Mahmood DOA and Mr Taha head of Nimroud Agriculture. The 3 farmers ran the field day and presented and discussed developments with their ZT modification of 3 local seeders, the 250ha of crops sown by each, and the cost savings and yield benefits experienced. This will give a great boost to ZT credibility and farmer interest and uptake in Ninevah and Iraq.

## **ICARDA, Syria**

Over 300 visitors inspected, discussed and received seminars on the conservation cropping R&D being undertaken at ICARDA. This included participants, trainees and students from: Mosul University (15) agronomy and agro-machinery departments; Tishreen University, Lattakia (40); Afghanistan JICA IPM course (20); the First CGIAR Independent Science Partnership Council meeting (20); King Faisal University, Saudi Arabia (2); the 5th International Food Legume Conference (20); Sudan agricultural research/development institutions (4); Teshreen University agricultural machineries department, Tartous (30); the Lebanese MOA Minister and staff (20); South Asia (India/Bangladesh) agricultural institutions (5); ACSAD (3); Borlaug Iraqi fellows and USA mentors workshop (10); FAO (Dr Amir Kassam) and Syrian Agha Khan Foundation (5); DG CIMMYT (Thomas Lumpkin); CIMMYT CA Program (Pat Wall); IFAD Near East and North Africa Division (50), and 60 Syrian scientists/farmers during planning of the project's 2009-10 ZT extension program and field days.

Other visitors inspecting project research and development included:

- Mr Cameron Tubby, an Australian farmer and GRDC Nuffield Scholarship recipient, on 31July-7Aug09, investigating innovative, sustainable and profitable farming systems for the Mediterranean and semi arid climatic zones of the dry land agriculture areas of Western Australia. Cameron gave a seminar on "Dryer than dryland farming in Western Australia" which was very relevant to the region

- Ambassador Robert Tyson and First Secretary Jonathan Ball from the Australian Embassy in Baghdad, and Dr Randhir Singh from the Directorate of Wheat Research in Karnal India, during the ACIAR-AusAID Iraq project meeting on 27Sept-1 Oct09. Jonathan Ball also visited on 8-9Mar10.

Over 100 visiting trainees (47 scientists and 18 farmers from Iraq; 14 GCSAR/DofE scientists and 14 farmers from Syria; 2 technicians from Libya; 10 ICARDA scientists) inspected and discussed conservation cropping R&D at ICARDA whilst participating in the following courses: socio-economic planning and evaluation, 26-28July09 - 6 Iraqi participants; GIS landuse/cover mapping, 4-8Oct09 - 3 Iraqi participants; Crop Management and Post Harvest Operations in Quality Seed Production, 27Sept-8 Oct - 1 Iraqi participant; ZT plot seeder assembly, operation and maintenance, 25-29Oct09 - 3 Iraqi + 4 ICARDA participants; Advanced design and analysis of experiments, 8-19Nov09 - 1 Iraqi participant; Participatory extension, 19-23April10 - 16 Iraqi + 6 Syrian + 1 ICARDA participants; Iraqi farmers ZT study visit, 25-29April10 - 18 Iraqi, 14 Syrian + 2 Libyan + 2 ICARDA participants; Variety identification and maintenance, 2-20May10 - 4 Iraqi participants; Data management, ANOVA, regression: Excel and Genstat, 4-13May10 - 9 Iraqi + 3 Syrian + 4 ICARDA participants; GIS/Remote sensing, 16-27May10 - 3 Iraqi participants; ZT and agronomy research experience, 16May-30June10 - 3 Syrian collaborators. Syrian collaborators (10) from GCSAR, Dept of Extension, and Agha Khan Foundation also spent a day at ICARDA hearing about, discussing and inspecting ZT R&D in preparation for the field days mentioned below.

As well as inspecting ICARDA research trials, the 23 trainees in the participatory extension course and the 36 participants in the farmer ZT study group, in a 'travelling workshop' mode, visited and inspected some 15 fields/crops of collaborating Syrian farmers undertaking ZT-CC demonstrations and local ZT seeder manufacturers from Kamishley in the east to El Bab/Aleppo in the west and Idleb/Salamiya to the south, seeing and discussing farmer and manufacturer experiences and perceptions with ZT technology and machinery. They were also among the 800 participants at 3 major farmer field days organised together with Syrian research, extension and NGO groups to see and discuss ZT vs CC comparisons at Salamiya Research Station on 20 April 10 (200 participants), and in farmer fields at Kamishley on 22 April 10 (250 participants) and Jarjanaz on 28 April 10 (350 participants). These visits exposed and explained ZT technology at both the scientific and basic farmer level and were significant in turning extension officer and farmer doubts about growing crops without cultivation into enthusiasm to test and adopt ZT more widely. They also showed and discussed effective ways to undertake participatory R, D and E and use demonstrations and field days to promote awareness, experience and adoption of ZT technology.

The on-going research and development to verify and refine ZT technology, the keen involvement of seeder manufacturers in further developing effective and affordable ZT seeders, the continuing increase in awareness of ZT by many stakeholder groups, and strong interest and involvement of farmers in testing and taking up ZT sowing, together with the higher yields and lower costs being experienced with the technology, provide a stronger foundation and confidence for wide adoption and impact. The wetter and better year in Iraq and Syria in 2009-10 has certainly been welcomed and is significant showing the potential of the technology.

## 4 Training activities

### ICARDA Syria

Twelve training courses/visits were undertaken involving 105 trainees (47 scientists and 18 farmers from Iraq; 14 GCSAR/DOA scientists and 14 farmers from Syria; 2 technicians from Libya; and 10 ICARDA scientists) on:

1. Socio-economic planning and evaluation, 26-28July09 - 6 Iraqi participants (Organiser: S Kaitaibi ICARDA)

Dr Saad Hatem Mohamed, SBAR, Baghdad, Iraq  
Mr Watheq Abdulqahar Abdullah, SBAR, Baghdad, Iraq  
Mr Bassam Yehya Qasim, DOA, Mosul, Iraq  
Mr Salim Younis Sultan Al-Niaamy, Mosul University, Mosul, Iraq  
Dr Emad Yousif Isameel Abdullah, Mosul University, Mosul, Iraq  
Mr Mahdi Saleh Kheder, SBAR, Mosul, Iraq

2. GIS landuse/cover mapping, 4-8Oct09 - 3 Iraqi participants (Presenter: W Wu ICARDA)

Mr Amjad Khalil Mahmoud, DOA, Mosul, Iraq  
Mr Abdul Albasat Muhamed Ali, DOA, Mosul, Iraq  
Mr Mahmood Ahmed Hassan, DOA, Mosul, Iraq

3. Crop management and post harvest operations in quality seed production, 27Sept-8 Oct - 1 Iraqi participant (Presenters: A Niane, Z Bishaw, A Madarati)

Mr. Selou Sito Murad, DOA, Mosul, Iraq

4. ZT plot seeder assembly, operation and maintenance training, 25-29Oct09 - 3 Iraqi and 4 ICARDA participants (Presenter: C Warner, Adam Warner Engineering, South Australia)

Dr Maan Salih, SBAR, Mosul, Iraq  
Mr Younis Qasim, SBAR, Mosul, Iraq  
Mr Mhana Abdul Rahman, SBAR, Mosul, Iraq  
Mr Shukri Isamel, ICARDA, Syria  
Mr Ahmed Al Turkey, ICARDA, Syria  
Mr Colin Norwood, ICARDA, Syria  
Dr Colin Piggin, ICARDA, Syria

5. Advanced design and analysis of experiments, 8-19Nov09 - 1 Iraqi participant (Presenter: K El-Sham'aa, ICARDA)

Salim Himmade Anter, College of Agriculture & Forestry, University of Mosul, Iraq

6. Best practices for collecting and conserving genetic resources, 18-30April10 - 1 Iraqi participant (Presenters: Genetic Resources Section ICARDA)

Mrs Sanaa Abdul Wahab Al Sheick, SBSTC, Baghdad, Iraq

7. Participatory extension, 19-23April10 - 16 Iraqis, 8 Syrians, 1 ICARDA participants (Presenters: J Fortune and M Wurst, University of Adelaide/SARDI; C Piggin, A Haddad, N Trabulsi ICARDA; O Youssef GCSAR)

Mr Khalil Ibrahim Dabo, SBAR  
Mr Salah Hammadi Ali, DOA, Al Namroud  
Mr Abdulkareem Jooli Abdo, DOA, Shikhan, Mosul, Iraq  
Mr Yousef Samo Yousef, DOA, Al Kosh, Mosul, Iraq  
Mr A'ed Rashad Ishak. DOA. Ba'ashika, Mosul, Iraq  
Mr Saadallah A. Mohammed, DOA, Telkief, Mosul, Iraq  
Mr Abdullah Khalaf Asfoor, DOA, Al Kayara, Mosul, Iraq  
Mr Khalaf Ibrahim Kheder, DOA, Senjar, Mosul, Iraq  
Mr Kheder Khafif Zegam, DOA, Bea'aj, Mosul, Iraq  
Mr Sou'd Abdullah Mohammed, DOA, Al Ayadah, Mosul, Iraq

Mr Ali Akbar Hasan, DOA , Al Shamal, Mosul, Iraq  
Mr Osama Saad Abduljabbar, DOA, Mosul, Iraq  
Mr Theyab Najem Hasan, DOA, Hamadanieh, Mosul, Iraq  
Mr Sulieman Asaad Mohammed, DOA, Mosul-Faydeh  
Mr Mohammed Ahmed Mohammed, DOA, Mosul, Iraq  
Hesham Mahmood Hassan, Professor in Mosul University, , Mosul, Iraq  
Dr Omran Youssef, GCSAR, Kamishley, Syria  
Mr Elias Khouli, Department of Extension, Damascus, Syria  
Ms Rehab Al Khateeb, GCSAR, Salamiya, Hama, Syria  
Mr Hussein Sheikho, GCSAR, Hassakeh, Syria  
Mr Na'eem Jeje, SYLICO, Ras Al Ein, Hassake, Syria  
Mr Eid Al Issa, Department of Extension, Idleb, Syria  
Mr Khaled Younes, Department of extension, Hassakeh, Syria  
Mr Angham M. Ali, GCSAR, Kamishley, Syria  
Mr Yaseen Khalil, ICARDA, Aleppo, Syria

**8. Iraqi farmers ZT study visit, 25-29April10 - 18 Iraqis, 14 Syrians, 2 Libyans, 1 ICARDA participants (Presenters: C Piggan, A Haddad, N Trabulsi ICARDA; O Youssef GCSAR)**

Mr Zaid Abdulsalam Mostafa, farmer, Mosul, Iraq  
Mr Feras Fathy Khalaf, farmer, Mosul, Iraq  
Mr Mohammed Hasan Ibrahim, farmer, Mosul, Iraq  
Mr Adel Mohammed Kheder, farmer, Mosul, Iraq  
Mr Khaled Mahmoud Husien, farmer, Mosul, Iraq  
Mr Mohammed Abdulsattar Mohammed, farmer, Mosul, Iraq  
Mr Abdulkhaleq Abdulsattar Hasan, farmer, Mosul, Iraq  
Mr Dahham Rashad Ajaj, farmer, Ba'ashika, Mosul, Iraq  
Mr Abbas Saber Ali , farmer, Mosul, Iraq  
Mr Khalaf Fathy Balo , farmer, Mosul, Iraq  
Mr Husien Obaid Matar , farmer, Mosul, Iraq  
Mr Sinan Al Jalili, farmer, Al Nimroud, Mosul, Iraq  
Mr Wa'd Sa'adoun A'azab , farmer, Mosul, Iraq  
Mr Mohammed Abdulaziz Abdulqader , farmer, Mosul, Iraq  
Mr Gazee Hekmat Fathi, farmer, Al Namroud , Mosul, Iraq  
Mr Yaser Abdullah Fathi , farmer, Mosul, Iraq  
Mr Fathi Ali Najem , farmer, Mosul, Iraq  
Mr Abed Sadek Yousef , farmer, Mosul, Iraq  
Mr Zuhdi Majeed Dawood, farmer, Kamishly, Syria  
Mr Mohammed Talal Al Khaliefeh, farmer, Aleppo, Syria  
Mr Ali Al Elewy, farmer, Kamishly, Syria  
Mr Mohammed Manee Al 'akoob, farmer, Kamishly, Syria  
Mr Yousef Mohammed Abdul Mohammed, farmer, Idleb, Syria  
Mr Abdulrazak Husien Hashash, farmer, Syria  
Mr Ali Aref Turkieh, farmer, Salamieh, Syria  
Mr Sa'eed Mostafa Othman, farmer, Hama, Syria  
Mr Edris Mohammed Saleh Khaled, farmer, Kamishly, Syria  
Mr Mohammed Sa'eed, farmer, Aleppo, Syria  
Mr Abdulrahman Khalil, farmer, Hassakeh, Syria  
Mr Abdullatif Hasan Al Khaled, farmer, Hama, Syria  
Mr Abdulaziz Khalil, farmer, Hassakeh, Syria  
Dr Salim Khoja, farmer/GCSAR engineer, El Bab, Aleppo, Syria  
Mr Ali Gebril Husien, Research Assistant, ARC Libya  
Mr Abdullah Mohammed Abdulsalam, Research Assistant, ARC Libya  
Mr Yaseen Khalil, research assistant, ICARDA, Aleppo, Syria

**9. Variety identification and maintenance, 2-20May10 - 4 Iraqi participants (Presenters: A Niane, Z Bishaw, A Madarati)**

Mr Qahtan Saeid Ibrahim, SBSTC, Mosul, Iraq  
Mr Eesam Younes Saeed, SBSTC, Mosul, Iraq

Mr Abdullah Mohamed Ahmed , SBAR, Mosul. Iraq  
Mr Niama Hussein Darweesh, University of Moaul, , Mosul, Iraq

**10. Data management, ANOVA, regression: Excel and Genstat 4-13May10 - 9 Iraqi, 3 Syrian, 4 ICARDA participants (Presenter: J Berger, CSIRO/UniWA)**

Mr Khaled M. Al Zubaidy, University of Mosul, Iraq  
Mr Moyassar Mohammed Aziz, University of Mosul, Iraq  
Mr Muhsin Laej al Musawi, MOA, Baghdad, Iraq  
Mr Jamal Al Hazza, SBAR, Mosul, Iraq  
Mr Ali Jasem Al Laili , SBAR, Mosul, Iraq  
Dr Saad Taha Al Malk, SBAR, Mosul, Iraq  
Mr Saad Flaih Hassan, SBAR, Baghdad, Iraq  
Ms Maha Nayyef Kadhim, SBAR, Baghdad, Iraq  
Mr Watheq Abdullah Scientific , SBAR, Baghdad, Iraq  
Abdul Hameed al Khaled, GCSAR/Al Ba'ath University, Hama, Syria  
Mr Sultan Sheikh Moos, GCSAR, Kamishly, Syria  
Mr Khalil Al Sa'eedi. Cereal Organization, GOSM, Aleppo, Syria  
Dr. Colin Pigginn, ICARDA, Aleppo, Syria  
Mr Atef Haddad, ICARDA, Aleppo, Syria  
Mr Yaseen Khalil, ICARDA, Aleppo, Syria

**11. GIS/Remote sensing, 16-27May10 - 3 Iraqi participants (Presenter: E De Pauw, ICARDA GISU)**

Mr Amjad Khalil Mahmoud, DOA, Mosul, Iraq  
Mr Abdul Albasat Muhamed Ali, DOA, Mosul, Iraq  
Mr Mahmood Ahmed Hassan, DOA, Mosul, Iraq

**12. ZT and agronomy research experience, 16May-30June10 - 3 Syrian collaborators (Organisers: A Haddad, C Pigginn ICARDA)**

Ms Rihab Al Khateeb , Kreem RS, Salamiya, Hama, Syria (16-20May10)  
Ms Nalin Asaad, Sfaya Extension Unit, Hassake Extension Directorate, Syria (23-27May10)  
Mr Abdul Rahman Al Omar, Jarjanaz Extension Unit, Idleb Extension Directorate, Syria (30May-3June10)

**Australia**

Seven trainees travelled to Australia on study visits and post-graduate training:

**1. ZT, hay and seed production study visit, South Australia/Victoria - 3-29Oct09 (UniAdelaide)**

Dr Saad Abdul Jabbar Samir UniMosul  
Mr Jaafar Sedeeq Saeed, DOA  
Dr Kasim Khalil Kasim, SBAR

**2. Soil and plant nutrition study visit, Albany - 18Oct09 -26 Mar10 (AgWA)**

Dr Saad Daoud Taha Almalk, SBAR

**3. Weed management study visit, Roseworthy campus - 14May - 15 Oct10 (UniAdelaide)**

Dr Ahmed Mohammad Sultan Ahmad, UniMosul  
Dr Salim Himmade Anter, UniMosul

**4. Conservation cropping PhD - 4June10-July14 (UniWA)**

Mohammed Amin Hajy Ahmed, UniMosul

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## 5 Intellectual property

None

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## 6 Variations to future activities

None

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## 7 Variations to personnel

None

## 8 Problems and opportunities

Under Australian training, there is funding for 2 PhD, 4 MSc and 10 study-research visits (6 months) in the project.

This was discussed at the Sept08 annual meeting and nominations were received in Jan09 from MOA project coordinator Dr Saleh Bader for 2 PhD, 3 MSc and 9 study visits. Australian partners evaluated/arranged trainee qualifications/interests, suitable courses, willing supervisors, invitation letters, and enrolment. Acceptance of suitable nominees was advised to Iraq June09.

By the annual meeting in Sept09, more nominations had been made with a total of 2PhD, 4 MSc, and 5 study-visit trainees accepted. Applications for visas were finalised at the meeting and Australian arrangements made in the next 3-4 months.

After the annual meeting, the following trainees who had arranged visas earlier travelled to Australia in Oct09 on study visits:

1. Dr Saad Samir UniMosul; Mr Jaafar Saeed, DOA; Dr Kasim Khalil, SBAR, on ZT, hay and seed production in S Aust/Vic, 3-29Oct09 (UniAdelaide support)
2. Dr Saad Almalk, SBAR, on soil science at Albany WA, 18Oct09 -26 Mar10 (AgWA support)

Saleh Bader MOA was advised in Feb10 that arrangements and visas were finalized for other accepted trainees. Since then, MOA trainee travel to Australia has been prevented because MOA approval has not been given.

Despite emails, telephone calls and a letter to the Iraqi Minister of Agric from the ICARDA DG, Dr Mahmoud Solh, no advice on MOA approval has been received. Delays have required inconvenient and costly re-organization of enrolment, travel, accommodation and English training plans and new visas where Uni enrolments have expired.

UniMosul advised in Apr10 that their scientists can travel without MOA approval and agreed studies have been taken up by:

- 1) Drs Ahmed Sultan and Salim Anter on weed science, 14May-15Oct10 with UniAdelaide support
- 2) Mohammed Ahmed on a conservation cropping PhD, 4June10-June14 with UniWA support

The long-term Australian training program for MOA scientists is requiring an inordinate amount of time and organization for ICARDA and Australian partners and will need review if MOA approval delays continue.

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## 9 Budget

Transfers from Australia were \$1,047,859 in October 2009 and \$435,724 in March 2010. Expenditure from July 2009 to May 2010 was \$1,622,008. The cash balance as of 31 May 2009 was \$451,036.

There was a cash transfer to Ninevah institutions (~\$27,500) and a bank transfer to MOA Baghdad (~\$55,000) in October 2009 to support 2009-10 field activity.

Fund transfers to all Australian institutions were undertaken according to budget.