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Contents

1	Progress summary	4
2	Achievement against activities and outputs/milestones	7
3	Impacts	19
3.1	Scientific impacts	19
3.2	Capacity impacts.....	19
3.3	Community impacts	20
3.4	Communication and dissemination activities	21
4	Training activities	24
5	Intellectual property	28
6	Variations to future activities	29
7	Variations to personnel.....	30
8	Problems and opportunities	31
9	Budget	32

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 19-23 September 2010, with 51 participants: 35 from Iraq, 3 from Australia and 13 from ICARDA. 2008-09 activities and achievements were presented and the 2009-10 workplan developed/agreed.

In Ninevah, demonstrations of ZT versus traditional cultivation with high and low seed rates with barley, bread wheat and durum wheat were established at 13 locations with 13 farmers. Chickpea was included at the Al Kosh site. Rainfall varied from 123 to 547mm with harvests good in 10 locations. Demonstrations covered 168 ha, with 161ha of ZT.

Numbers of farmers and areas of ZT outside the demonstrations were as follows:

- 20 farmers grew 5135ha of ZT using their modified local seeders
- 1 farmer grew 30ha of ZT using a new ZT seeder made by farmers/Riad Hamdoun Engineering Mosul
- 6 farmers grew 483ha of ZT crops using the three 4m-wide trailed ZT tine seeders from Syria
- area grown using 14 new Syrian seeders funded by USA project in Twajna, Hamdania unreported

Overall, ≈6000ha of ZT crops were grown by 54 farmers in Ninevah. About 80% of this area was actual adoption, by farmers using their own or a rented/borrowed ZT seeder.

Field days were held in Ninevah at demonstration sites in Al Namroud on 14 May, Al Kosh on 15-6 May and Tel Kief on 23-24 May, with some 120 farmers and technicians attending from Ninevah and neighbouring Anbar, Kirkuk and Wasit Governorates. There were presentations and inspections of ZT demonstrations with wheat, barley, lentil, chickpea and lentil; seed rate comparisons; and new oat and pea crop introductions. Farmers were very interested in local ZT seeders and the excellent performance of ZT crops.

In linked participatory extension in Syria, farmer demonstrations were established in 11 locations across north and west Syria. Some 450+ farmers established 15,000+ha of ZT crops. About 70% of this area was actual adoption, by farmers using their own or a rented or borrowed ZT seeder. The rest was sown with local ZT seeders provided without cost or charge by ICARDA, Aga Khan Foundation and Aleppo Agricultural Machinery Center.

Autumn field days were held in Syria in October-November at 9 Aga Khan on-farm demonstration sites at planting of ZT/CC treatments. A spring field day planned on 3 May for the Extension Training Course was cancelled due to security concerns and replaced with visits to Aga Khan farmers and the GCSAR Research Station in Salamiya.

Some ZT farmer fields, as well as research trials at ICARDA, were used during training courses involving Iraqi and Syrian researchers, extension officers and farmers, and for many visitors, to inspect and discuss ZT. It was a first exposure for many to trials and demonstrations on crop management issues such as ZT, low seed rates and early planting and they were impressed by possibilities for improved yields and reduced costs.

In Ninevah, 33 research trials were conducted, with 23 at UniMosul and SBAR on evaluation of elite lines and varieties of wheat, barley, chickpea, lentil, faba bean, vetch, lathyrus, oats and peas and 10 at UniMosul on crop management involving weed surveys, hardpan amelioration, press wheels, ZT vs CC/herbicide comparisons in wheat and irrigation-fertilizer responses in peas. Trials grew well with harvesting in May/June.

At ICARDA, 14 trials for ZT technology verification/refinement and Iraqi scientist and farmer training were conducted on: crop and variety performance under ZT and CC; time, seed rate and depth of sowing; evaluation of alternative crops (oilseeds, oats, peas); and increasing wheat frequency in wheat-lentil-camelina rotations. All trials established and grew well with 259mm of rain. Growth was generally better from ZT than CC and early than late sowing. Cereals and legumes did best with early planting, 50-100kg/ha seed rate, 4-8cm seeding depth, and press wheels. Trials were harvested in May/June.

In Iraq, local ZT seeder fabrication continued with the Ninevah farmer group Eighteen ZT modification kits costing \$1,200 were made with 17 fitted to farmer seeders and one given to the University of Mosul for teaching. These 17 new seeders, plus the 3 prototypes made earlier, were used to sow 5135ha of ZT crops. A new 2.3m ZT seeder for small farmers was fabricated by the farmer group together with Riad Hamdoun Engineering in Mosul and used to sow 30ha on one farmer field. The farmer group set up and registered the "Mosul Conservation Farming Group" and hopes to interact with other No Till Farmer's Associations.

In Syria, collaboration on ZT seeder fabrication was expanded to include 3 more manufacturers in north eastern Syria, who all produced excellent ZT seeders. There are now 7 manufacturers in Syria, which provides more diversity and locations for purchase and maintenance by Syrian and Iraqi farmers and projects. Between 2008 to mid-2011, Syrian manufacturers had made ≈65 ZT seeders for local and regional clients.

Major efforts by DOA, UniMosul and SBAR to develop on-farm seed production continued. Spike/line selection and production of foundation seed of wheat and barley varieties continued. New varieties from ICARDA were introduced into the program. The 21 VBSE farmer seed growers planted 100t of certified durum wheat purchased with funds provided by the Ninevah Governor and 83t of seed produced in 2009-10 and expect, with access to irrigation, to harvest over 1820t of seed. This would exceed the project target of 9 VBSE groups producing 100t of seed.

Major efforts were also made to undertake the socio-economic survey on adoption and impact of project technologies (especially ZT) and technical and financial aspects of farmer seed production. Following the training course on surveying and data collection at ICARDA in February, participating UniMosul and DOA staff arranged and coordinated surveys to collect data from 500 farmers, from demonstration locations and from seed producers. Surveying is proceeding following harvest and, once data is assembled in Ninevah, it will be analysed and evaluated in Baghdad.

In capacity enhancement at ICARDA, there were 78 Iraqi scientist and technician training visits with 43 participating in 6 formal training courses and 35 in the annual meeting where one Australian collaborator gave a seminar on achievements of the ACIAR Project on enhancing profitability, production and quality of wheat in India. This training, with

Australian partners delivering two of the courses and an Iraqi partner delivering one, was focused on specific priority areas for the project: Photography and presentations; Seed enterprises and marketing; Socio-economic surveying and evaluation; ZT seeder design, fabrication and operation; Variety identification, maintenance and seed production; and Participatory extension. In addition, 24 scientists, farmers and machinery manufacturers from Syria and North Africa also participated in the ZT and extension courses. The mix of trainees from different countries provides rich exchange of experiences and ideas.

Two visits, one by 9 Iraqi, 13 Syrian, and 5 North African/Turkish scientists and seeder manufacturers for ZT seeder training, and the other by 13 Iraqi and 6 Syrian extension officers for participatory extension training, which involved field visits to collaborating machinery manufacturers, farmers, extension offices and research stations, were valuable in enhancing knowledge of ZT seeders and effective participatory R, D and E.

Eleven Iraqis and 2 Syrians travelled to Australia on study visits and post-graduate training. After long delays, one PhD and 4 MSc students started English studies and research proposal development in January-February 2011 in preparation for enrolment at the Universities of Adelaide and Western Australia. Following English evaluation, it is clear that language training will take at least 12-18 months rather than the allowed 6 months.

Six Iraqi and 2 Syrian extension officers/researchers undertook an extension/zero tillage study visit to Western Australia in August/September 2010, visiting research and extension centres and participating in field days.

Unfortunately, 3 trainees who travelled in May-June 2010 to Australia on a weed management study visit to the University of Adelaide (2) and a conservation cropping PhD to the University of Western Australia (1) had difficulty settling into their studies and returned to Iraq in August, before training was completed.

Project activities and developments were communicated to scientists, farmers, students, policy makers and the public in many ways. ICARDA receives a large number of visitors each year; many were shown project R & D activities with selected groups also travelling outside ICARDA to visit local ZT seeder manufacturers and farmers adopting ZT.

The project generated considerable publicity and media coverage in Australia, following visits by journalists from the ABC and Cosmos Science magazine. Detailed project information including project documents, reports and presentations was updated on the ICARDA web site (<http://www.icarda.cgiar.org/ACIAR/Index.htm>).

The project collaborated with Syrian Extension and Research Directorates to develop an extension/demonstration film for TV to raise farmer awareness of conservation cropping and its benefits for local agriculture. The 18 minute film, in Arabic, is excellent and was broadcast regularly on Syrian TV before autumn planting. DVDs were distributed to Iraqi trainees and other visitors.

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 about 6,000ha in 2010-11. In project-related development in Syria where the technology was similarly little known or tested, total ZT area from project interactions was about 15,000ha in 2010-11. The on-going increase in awareness, research and development of 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. In Iraq, interest and visits from other Governorates are spreading ZT technology beyond Ninevah.

The project has greatly increased awareness and experience of ZT technology. The Ministries of Agriculture in both Iraq and Syria are considering adoption of conservation cropping as a major platform for future dryland cropping systems development.

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 insecurity and regular disruptions to local travel. Linked research and development activities and training in ICARDA were disrupted later in the year by insecurity in Syria.

Management

The Ninevah Central Committee has not been active in 2010-11. It is reportedly not easy or safe to gather regularly in Mosul. Interaction 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 zero till seeders and seed production equipment, and field days. Planned work was well implemented by Ninevah institutions.

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 (Drs Paul Fox, John Dixon) on 28 and 29 January, 3 February, 3 and 11 March, and AusAID (Dr Joel Thorpe, David Swete Kelly) on 2 February in Canberra to discuss the progress and future of the project
- 2) Dr John Angus, the ACIAR-appointed project reviewer, at CSIRO Canberra to discuss project activities, progress and reports on 8 and 24 February
- 3) the Iraqi AusAID-sponsored Ministerial delegation to Australia led by Deputy Minister Dr Mahdi Dhamad Al-Kaisi, which included project collaborator Dr Saad Hatem from SBAR Baghdad, together with Drs Frank Thomson and David Swete Kelly, to present and discuss project activities, on 4 February. The delegation visited the University of Western Australia on 31 January 2011 and met with Vice Chancellor Professor Alan Robson, Professor Kadambot Siddique, senior staff and two Iraqi MSc students sponsored by the project and were impressed with UWA involvement in Iraq agriculture/capacity building.
- 4) Australian partners in Adelaide (Drs David Coventry, Jason Eglinton, Wayne Meyer, Jeff Paull, University of Adelaide; Jack Desbiolles, University of South Australia; Jay Cummins and Jim Fortune, Rural Solutions SA) and Perth (Drs Kadambot Siddique, University of Western Australia; Doug Abrecht and Wal Anderson, Department of Agriculture; Jens Berger, CSIRO Plant Industry) on 10-19 February 2011 to discuss activities, progress and training plans. This included meetings with senior Executives of UWA and UniAdelaide, with University International Centres arranging the logistics of postgraduate training in Australia, and with supervisors of Iraqi post-graduate students. It also included meetings with the post graduates undertaking initial English studies and preparing research plans in Adelaide (PhD cereal breeding - Jamal Abdufattah Yousuf SBAR Mosul; MSc economics - Mahdi Salih Kheder SBAR; MSc salinity - Alaa Fakher Kadham Al-Hameedawi SBAR Al Wadha) and Perth (MSc GIS - Mahmoud Ahmed Hassan Al Ardeny DOA; MSc agronomy - Ayman Taher Mohsen Al Hobaita DOA).

There were several high-level AusAID visits to ICARDA for discussions on AusAID-funded projects in Iraq, undertaken by Dr Joel Thorpe on 27Sept10 and 28Feb11 and David Swete Kelly on 28Feb11, which also involved presentations and field visits on project activities and progress. There was a major meeting on 21-13 June with Geoffrey O'Keefe, David Swete Kelly (AusAID) and Brendan Brown (ACIAR) in Amman, Jordan, on the AusAID Iraq Strategy and project future.

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

no.	activity	outputs/ milestones	completion date	comments
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 10 Sept-Oct 10 Sept-Oct 10	Reporting/planning meeting held at ICARDA on 19-23 Sept10. 51 participants attended: SBAR Baghdad 4, SBAR Ninevah 5, SBSTC Ninevah 2, DOA Ninevah 16, University of Mosul 8, Australia 3, ICARDA 13 The 10-11 demo workplan with "best bet" technologies was developed considering constraints and year 2 results. Major advances were agreement to compare 'proven' technologies with farmer practice (ZT vs CC; low vs high seed rates to replace early vs late sowing, as farmers now accept early planting). The 'chisel plough' treatment, little used by farmers, was omitted. Treatment replications (3) were retained

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 10</p> <p>Sept 10 -May 11</p> <p>Yr 1, 2, 3 on-going</p> <p>Yr 2, 3 m3</p>	<p>Workplan developed (see 1.1). Progress in Iraq In 13 locations (LRA-3, MRA-3, HRA-3, SI-4) on-farm demos of ZT vs CC with 3 seed rates (80-140kg/ha) established in Nov-Jan. Crop/variety: LRA - local barley; MRA - BW (Cham 6) and barley (Rihane); HRA - DW (OmRabia 5); LRA-MRA-HRA SI - BW and DW. Chickpea (Gab 4, Kokjy) at Al Qash. Demos covered 168 ha, with 56ha of ZT</p> <p>Oct-May R/F (mm): LRA (Tel Abta 149, Al Hatra 123, Mahalabia 211), MRA (Bashyka 335, Tel Kief 287, Hamdania 307), HRA (Qash 376, Shekhan 547, Rabiaa 278), SI (Namrod 325, Mahalabiah 211, Shekhan 547, AlQuosh 376).</p> <p>13 farmers grew 161ha of ZT crops in project demos 20 farmers grew 5135ha of ZT using their modified local seeders 1 farmer grew 30ha of ZT using new 2m ZT seeder from farmers and Riad Hamdoun Eng Mosul 6 farmers grew 483ha of ZT crops using the three 4m-wide trailed ZT tine seeders from Syria ZT area grown by farmers using 14 Syrian seeders under USA in Twajna-Hamdania unreported Overall, ≈6000+ha of ZT crops grown by 54 farmers in Ninevah Crops failed in LRA but grew well in other locations; harvests in May Field days in Namroud 14May (60), Al-Kosh 15May11 (30), Tel Kief 22-23May (14) with Ninevah, Anbar, Kirkuk, Wasit Governorate farmers, engineers and students Progress in ICARDA - Syria Linked farmer demos conducted in 11 locations with Dept Ext, GCSAR, Agha Khan, SYLICO, Machinery Training Center, seeder makers, farmers. Program was reviewed at 5Aug10 meeting at ICARDA with 81 participants. A local ZT seeder was placed in each location and 20-40 farmers encouraged, without charge or payment, to try ZT. 450+ farmers grew 15,000+ha of ZT crops. Autumn field days held at 9 Agha Khan Salamiya sites Oct-Nov10 Field days for Iraqi trainee groups cancelled-replaced as follows: a) ZT seeder trainees (30) visited farmers-seeder manufacturers, El Bab-Qabbassin 26Mar11 b) particip ext trainees (23) visited farm demos-research station Salamiya 3May11</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 determine work plan Demonstration trials established Field days and visits to promote farmer awareness/adoption Evaluation of results and reporting	Sept 10 Sept 10-May11 April-May Yr 2, 3 on-going Yr 2, 3 m3	13 demos focused on proven 'best bets' of ZT vs CC and seed rates. Chisel plow and variety treatments dropped because comparisons showed no consistent differences for farmers and are costly in large demo plots No variety demos except at AIQash, 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	Sept10 On-going	Workplan determined (see 1.1) In Iraq, seed from 09-10 trials and nurseries evaluating bread wheat, durum wheat, barley, chickpea, lentil, oats, peas, vetch, lathyrus, saltbush, safflower saved. 31 ICARDA drought/disease nurseries (6 chickpea, 1 faba bean, 1 lentil, 1 grass pea, 7 barley, 2 durum wheat, 1 bread wheat) rec'd Ninevah 21Nov10

2.2	Screening, evaluation and selection of improved germplasm in Ninevah (PC)	<p>Screening trials established</p> <p>Evaluation of results and reporting</p> <p>Field days and visits to promote farmer awareness/adoption</p> <p>Selected improved lines moved into activity 1.3 in demonstration program</p>	<p>Nov10-Jan11</p> <p>Yr 2, 3 m 3</p> <p>Yr 1, 2, 3 on-going</p> <p>Yr 2,3 m4</p>	<p>Replicated Yield Trials/Nurseries tested ICARDA lines. Many were 'best' 09-10 elite-line selections</p> <p>Uni Mosul</p> <p>a) bread wheat (40 and 120 lines)</p> <p>b) durum wheat (40 and 46 lines)</p> <p>c) barley (41) lines</p> <p>d) chickpea (drought, winter nurseries)</p> <p>e) barley (2 cvs), bread wheat (2 cvs), durum wheat (2 cvs) in large fields (1.25ha) in different rainfed locations (PhD study)</p> <p>f) adaptation trials continued on peas (4 lines) and oats (5)</p> <p>SBAR Ninevah</p> <p>(RRS=Rasheediya Res Stn, MRA 297mm; T=Telafar Res Stn LRA 216mm; all trials RCB design with 3 reps)</p> <p>a) bread wheat (Angi-4, Izaz, Dajaj-5, Sham-6, Abu Graib-3 local, babaga-3) sown 21Dec at RRS and T</p> <p>b) barley (Yazan, 5 Iraq-Nur-09, Local black) sown 21/26Nov at RRS and T</p> <p>c) lentil (10 'elite lines' and 9, 8 and 10 lines from 09-10 nurseries) sown 23/28 Dec at RRS</p> <p>d) chickpea (8 'elite lines' and 41 lines from 09-10 nurseries) sown 26/28 Dec at RRS</p> <p>e) faba bean (19 lines) own 22Dec at RRS</p> <p>f) common vetch (16 lines) sown 9Dec at RRS</p> <p>g) grasspea (16 lines) sown 9Dec at RRS</p> <p>Trials regularly evaluated for growth, pests, disease. All crops grew well with harvest May-June</p>
2.3	Screening, evaluation and selection of improved germplasm of wheat, barley, and forage legumes and grasses for adaptation to salinity in Iraq (PC)	<p>Screening trials established</p> <p>Evaluation of results and reporting</p> <p>Field days and visits to promote farmer awareness/adoption</p>	<p>Nov10-May11</p> <p>Yr 2, 3 m 5</p> <p>Yr 2, 3 m 3</p> <p>Yr 2, 3 on-going</p>	<p>One trial conducted in Suwaira Res Station, Wassit Governorate</p> <p>- 3 levels of salinity (1, 4, 8 dS/m) with 6 varieties of wheat (Sham 3, 5, 6, 8, Om-Rabia-5, Abu-Graib-3)</p> <p>Sown Dec10, grew well, harvested May11</p>

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>Sept10</p> <p>Oct10-Jan11</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 (5 trials)</p> <p>a) weed surveys at Nimroud, AlQash, TelKief, Mahalabia</p> <p>b) effect of subsoiler type- spacing (2.5, 5m) in wheat and barley in TelKief</p> <p>c) effect of press wheels on durum wheat</p> <p>d) effect of ZT vs CC and herbicides on wheat in AlNamroud, Telkief (PhD study)</p> <p>e) effect of fertilizer-irrigation on prod'n, grazing, grain quality of 5 oat cvs (PhD study)</p> <p>Good May-June harvests expected for all crops-locations</p> <p>Syria - ICARDA (14 trials)</p> <p>a) 3 LT trials on CC vs ZT with cereals/legumes, early/late planting, +/- stubble</p> <p>b) 2 trials with cereal (BW, DW, barley, oats) and legume (lentil, chickpea, faba bean, pea) vars under ZT vs CC</p> <p>c) 2 trials on seeding rate (50, 100, 150, 200, 300 kg/ha) under ZT vs CC with BW, DW, barley, lentil, chickpea</p> <p>d) 1 trial on sowing depth (1.5, 4.5, 7.5, 10.5cm) ZT BW, barley, lentil, chickpea</p> <p>e) 3 trials on planting times (5) of ZT wheat, barley, lentil</p> <p>f) 1 LT ZT trial on wheat frequency +/- NP in wheat/lentil/flax rotations</p> <p>g) 1 trial on +/- press wheels under ZT vs CC BW, barley, lentil, chickpea</p> <p>h) 1 trial on adaptation-yield of 12 species-lines of oil seed crops</p> <p>Rainfall 259mm: Temp <math>0^{\circ}</math>C 13 days mid Jan/mid Feb; 3 days mid Mar</p> <p>Generally, estab-growth better from early (Oct/Nov) than late (Dec/Jan) sowing and ZT than CC. Optimum seeding rates-depths ≈50kg/ha and 4-8cm.</p> <p>In LT trials, soil H₂O higher for ZT than CC early but similar by maturity. ZT increased shallow SOM and macro-aggregates</p> <p>No sig trends in cyst nematodes in wheat, barley, chickpea, lentil but higher with CC, late planting, chickpea</p> <p>Lentil tolerance to fusarium wilt and downy mildew differed for variety but not tillage x variety</p> <p>Japanese student completed MSc on management to reduce CCN in wheat in Syria</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 continued in one LT trial and soil and crop parameters (soil water, Nmin, microbial biomass, aggregate stability, biomass, LAI) measured intensively. Crop modelling undertaken in Apr-June11
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	Sept10 On-going Yr 2, 3 m3	ZT seeder fabrication workplan agreed (see 1.1) Iraq The innovative Ninevah farmer group (Sinan Jalili, Yasser Fathi, Gazee Fatehi, Waad Ahmad) continued ZT modification with local John Shearer-type seeders. Modification kits costing \$1200 fitted to 17 farmer seeders (one given to UniMosul for teaching). A new 2.3m ZT seeder for small farmers fabricated together with Riad Hamdoun Engineer, Mosul The 17 new and 3 old modified seeders were used to sow 5135ha of ZT crops. The 2.3m seeder was used by 1 farmer to grow 30ha of ZT crop ICARDA-Syria Collaboration initiated with 3 new manufacturers (Saleh Omar, Ein Al Arab; Mahmoud Al Khalaf, Al Hasakeh; Mohamed Al Alo, Al Raqqa), who benefited from ZT seeder training and produced excellent seeders By the end of June11, Syrian manufacturers had made ≈65 ZT seeders for local/regional clients (farmers 30, ICARDA 13, INRA Morocco 10, USA Ninevah 14)
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	Sept10 Nov-Dec10 Yr 2, 3 m3 Yr 1, 2, 3 on-going Yr 2,3 m4	Workplan determined (see 1.1.) ICARDA Trials conducted on oats and peas and brassicas (see 3.1 ICARDA b and h) and all grew well with good seed production. Oat seed (Mitika) given to interested farmer Ahmad Yagen, El Bab, to test value for rotations, fodder and grain Iraq UniMosul Trials conducted on oats and peas (see UniMosul 2.2f and 3.1e)
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	Lentil grown in stubble retention-removal treatments in LT trial at ICARDA. The whole crop hand harvested according to local practice as grain and straw are valuable. The trial simulates grazing effects 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	Nov10-Jan11	ZT demonstrations established with ≈60 farmers over ≈6000ha in Iraq and ≈450 farmers over ≈15,000ha in Syria (see 1.2 and 1.3 for details).
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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	On-going	Final GIS training at ICARDA completed May10. One DOA GIS scientist commenced MSc studies at UniWA in Jan11
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	Planned to obtain satellite images and determine if ZT areas could be identified. Given weather and security situation in Iraq and Syria this was delayed. May be possible in 2011-12, including through new IFAD project in Ninevah (see 4.3)
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. Two trainees using skills in new 2011 IFAD project on improving barley and livestock production in Ninevah. 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 dropped from activities after Yr 1 due to lack of relevance, interest and suitable trainees from Iraq

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 (2.2t) to support trials (89kg) and demonstrations and seed production (2.2t) assembled/sent from ICARDA 22Dec10 and arrived Mosul 6Jan11

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 10 Nov10	Under SBAR, seed and spikes from 09-10 spike/row evaluations of durum (Cham1, OmRabi5) and bread wheat (Cham6, AbuGraib3) and barley (Rihane03, Zambaka) on-grown Nov-Dec10 for breeder (nucleus) seed production using: - bulk seed (10-20kg) in 400-800m ² plots at Rashidiya RS - spikes at Rashidiya RS (500) and Hamdania RS (50) Seed processing equipment (single spike thresher, bundle spike thresher, seed dresser) supplied for SBAR and UniMosul Training: - 3 Iraqis UniMosul, seed enterprise-marketing 1-11Nov10; - 1 Iraqi SBSTC Ninevah, seed production-maintenance 3Apr-31July11
5.3	Establish sustainable farm/village-based seed production enterprises (VBSEs) (PC)	Four VBSEs operational during Yr1 each producing 100 t seed An additional 4/5 VBSEs operational during Yr2 each producing 100 t seed Group training for farmers, extension services and other stakeholders organized each yr on technical and management aspects Seed demand survey conducted and business plans developed each yr Analysis of profitability of VBSEs conducted each yr to ensure sustainability and options for diversification Network/association of local seed production and marketing enterprises established at provincial level during Yr3	Yr 1 m12 Yr 2 m12 Yr 1,2,3 m12 Yr 1,2,3 m12 Yr 1,2,3 m12 Yr 3 m12	Qahtan Saeid Ibrhim, SBSTC seed officer advised: - unreleased varieties can be produced and exchanged locally - released varieties can be sold as seed nationally Major efforts by DOA and UniMosul to develop on-farm seed production continued with the 21 VBSE farmer seed growers. Using 100t of certified durum wheat (Om Rabiaa) purchased with funds provided by the Ninevah Governor, and 83t of seed produced in 2009-10, growers sowed 183t of seed and expect, with access to irrigation, to harvest over 1820t of seed (exceeds target of 9 VBSE groups producing 100t of seed) New ICARDA seed (BW - Babaga 50kg, Cham6 500kg; DW Cham9 500kg; Barley Rihane03 100kg, Zambaka 1t, Yazan 50kg; lentil ILL7957 10kg introduced into seed prodn program Survey of technical and financial aspects of farmer seed prodn conducted by the socio-economic team in Mar-June11 Discussions held in early 2011 with MOA Baghdad on setting up a Ninevah seed production committee together with growers

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	June11	<p>The socio-economic team (SBAR Baghdad: Saad Mohamed; MosulUni: Salim Al-Niaamy) met Mosul 14-15Dec10 to review progress and plan farmer and seed production surveys</p> <p>A course to train data collectors (11) held at ICARDA 13-27Feb11 (facilitators: Drs Saad, Salim, Emad)</p> <p>With better rainfall in 2010-11, surveys of 500 farmers plus demo farmers and seed producers will be completed, analysed and presented at annual 2011 meeting</p> <p>Surveys (53) collected in SI areas and analysed by MSc student (Supervisor: Dr Salim Al-Niaamy), who passed exam 15Dec10</p> <p>The Iraqi socio-economic team met in Baghdad several times to discuss progress, questionnaire design, monitor project progress</p> <p>There are some indications of initial impact and spill over, with some farmers and specialists from central and southern Iraq requesting ZT seeders produced in Mosul</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	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers
6.3	Identify sources of inefficiency and assess the impacts of improved options on increasing efficiency (PC)	Options for improving production inefficiency identified	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers
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	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers
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	June11	To be conducted in 2010-11 provided data from farmers (500), demos/trials and seed producers collected

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	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers
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	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers
6.8	Identify enabling policy and institutional options (PC and ICARDA)	Enabling institutional arrangements and policy incentives and options identified	June11	To be conducted using 2011 survey data from farmers (500), demos/trials and seed producers

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	Sept10	Topics for training in ICARDA and Australia agreed at annual meeting
7.2	Short term and individual medium-term training and joint data analysis (ICARDA)	Training conducted (25 trainees per year)	Sept10 - May11	Six training courses/visits undertaken involving 76 trainees (38 scientists, 4 farmers, 1 seeder manufacturer from Iraq; 10 GCSAR/DOA scientists, 1 farmer, 8 seeder manufacturers from Syria; 5 self-funded technicians from Turkey, Morocco, Tunisia, Algeria; 9 ICARDA staff) Statistics course (June) cancelled due to Aust travel ban to Syria (see details under 4 Training)
7.3	Thematic workshops (ICARDA)	New research areas identified, or work plans adjusted; new methodologies adopted	Sept10 Yr 3 m3	Seminar attended by 35 Iraqi, 2 Australian, 20 ICARDA scientists presented at Sept10 annual meeting by Dr David Coventry on "Enhancing farm profitability in India and South Australia by improving production and grain quality of wheat" from ACIAR Project CIM/2006//094 in India

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	Eleven Iraqis and 2 Syrians travelled to Australia on study visits and post-graduate training: - 5 PhD/MSc students started English studies and research proposal development in Jan/Feb11 in preparation for enrolment at UniAdelaide/UniWA - 6 Iraqi and 2 ICARDA scientists undertook an extension- zero tillage study visit to Australia 20 Aug - 29 Sept10 Unfortunately, 3 trainees (1 PhD at UniWA; 2 weed scientists in UniAdelaide) had difficulty settling into studies and returned to Iraq before training was completed (see details under 4 Training)
7.5	Support participation of Iraqi personnel in regional or international workshops and conferences of relevance to the project (All)	Conference attendance and report	Occasional	No scientists supported to attend workshops or conferences

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

3 Impacts

The 2010-11 rainfall has been good in all but low-rainfall-areas in Ninevah and reasonable in ICARDA and surrounds. Harvest was underway in May-June, with good yield prospects.

Socio-economic data are being collected and cost-benefit and adoption/impact evaluations will be undertaken after crops are harvested in 2011. Some positive impact-related experiences are discussed below.

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, local ZT seeder fabrication and alternative crops. Quite 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 of barley, bread and durum wheat, chickpea and lentil lines under CC and ZT at ICARDA, indicating present varieties-lines are well-adapted to ZT, dispel concerns that new varieties might be needed before ZT can be adopted widely and also contribute useful information to any consideration of appropriate germplasm evaluation methodologies in the region.

3.2 Capacity impacts

In capacity enhancement at ICARDA, there were 78 Iraqi scientist, technician, farmer and seeder manufacturer training visits with 43 participating in 6 formal training courses and 35 in the annual meeting where Dr David Coventry gave a seminar on "Enhancing profitability, production and quality of wheat in India." The training, with Australian partners delivering two of the courses and an Iraqi partner delivering one, was focused on specific areas related to the project: Photography and presentations; Seed enterprises and marketing; Socio-economic surveying and evaluation; ZT seeder design, fabrication and operation; Variety identification, maintenance and seed production; and Participatory extension. In addition, 24 scientists, farmers and machinery manufacturers from Syria, Turkey, Morocco, Tunisia, Algeria also participated in some of the courses. The mix of trainees from different countries provides rich exchange of experiences and ideas. The training enhanced knowledge of ZT systems and effective ways to undertake participatory R, D and E.

Eleven Iraqis and 2 Syrians travelled to Australia on study visits and post-graduate training. One PhD and 4 MSc students started in January-February 2011 at the Universities of Adelaide and Western Australia and there is no doubt their capacity in English and their areas of study is being greatly enhanced..

Six Iraqi and 2 Syrian extension officers/researchers undertook an extension/zero tillage study visit to Western Australia in August/September 2010, deepening experience in conservation cropping research and extension.

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 with colleagues for project implementation. This has

encouraged experience and capacity in planning, organisation, communication and innovation.

Enhanced capabilities are evidenced (see 3.4) by the leadership, experience and knowledge provided by project scientists and collaborating farmers to support:

- 1) an American-funded Provincial Recovery Team (PRT) project to provide Syrian-made ZT seeders and promote uptake of conservation cropping around Twajna, Hamdania
- 2) a new MOA program, building on project success, to extend conservation cropping to 4 other Governorates in north and central Iraq.

Capacity of SBAR and UniMosul to undertake R&D was enhanced with the supply of Syrian-made seed production and processing equipment on 10Oct10 as follows:

- a) two bulk plant threshers
- b) two single and bundle head threshers/cleaners
- c) two seed dressing machines

3.3 Community impacts

In Iraq, there have been no other projects developing and promoting ZT, according to Iraqi project collaborators. In Syria, a GCSAR project (2004-09) supported by the Arab Agency for Agricultural International Development (AAID) and an Arab Center for Studies of Arid Zones (ACSAD) project (2007-11) with the Directorate of Extension and GCSAR, have undertaken field trials/demonstrations, where crops were sown by project operators using imported ZT seeders. These projects have expanded awareness and experience of conservation agriculture in Syria but there was no adoption because of reliance on expensive, imported ZT seeders. When the ACIAR-AusAID project started in early 2005, there was clearly little awareness and no adoption of ZT in Iraq or Syria.

Surveys from the demonstration and seeder modification and fabrication activities of the project suggest ZT is being used by ≈60 farmers over 6,000ha in Iraq and 450+ farmers over 15,000ha in Syria in 2010-11. About 80% of this area in Iraq and 70% in Syria was actual adoption, by farmers using their own or a rented/borrowed ZT seeders. Most were impressed with the simplicity, good yields and lower costs of the ZT system and plan to continue using ZT providing there is access to a ZT seeder.

The farmers and machinery manufacturers involved in local fabrication of ZT seeders see the potential of the technology and possibilities to develop the ZT seeder 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

Economic benefits will come from higher yields and lower costs. Although there is very wide spatial and temporal fluctuation in rainfall and crop yields, project experience suggests wheat yield increases of 20% or more with ZT and early planting are not uncommon. Costs are reduced because cultivation is eliminated. An associated benefit from drill seeding (not necessarily ZT) is that sowing rates, often around 300kg/ha with local disc plough seeders which drop the seed above the discs, can be reduced to 50-100kg/ha. Other costs will not change much as the dry Mediterranean summers mean few weeds and only occasional need for pre-sowing herbicides (Glyphosate), whilst post-sowing crop management is similar for both systems.

With wheat costing US\$700/tonne in Iraq and \$400/tonne in Syria, increased returns from ZT may be an extra 20% or 250kg/ha for wheat, worth \$175/ha in Iraq and \$100/ha in Syria, and a saving of 2 cultivations worth \$40/ha. Reducing sowing rate from 300 to 100kg/ha would save \$140/ha in Iraq and \$80/ha in Syria.

With 2010-11 usage, net economic benefit from ZT could have been \$1,290,000 over 6,000ha for Iraq and \$2,100,000 over 15,000ha for Syria. Overall, it could have been \$3,390,000 over 21,000ha in Iraq and Syria. It would be higher with bigger yield responses, larger areas and higher value pulse crops.

A side benefit from access to ZT drill seeders and reducing seed rate might be \$84,000 for Iraq and \$1,200,000 for Syria.

In Iraq, the farmer group involved in local ZT seeder fabrication made and installed modification kits on the John Shearer-type seeders of 17 local farmers (and gave one to UniMosul). The modification kits cost \$1,200 and were funded by the project. It is anticipated there will be business opportunities supplying local ZT seeders in Iraq. 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 from the project.

In Syria, 3 new seeder manufacturers were added to the group of collaborating machinery manufacturers, with each producing excellent seeders. In 2010-11, the group sold ZT seeders to ICARDA (2), farmers (26), the USA PRT Project in Ninevah (14) and INRA Morocco (10). The sale of 52 ZT seeders, at prices around \$2,000-2500 for 2m and \$4,500-5,000 for 4m machines, is an outcome and impact from the project.

Since 2008-09, when ZT seeders were first made, collaborating manufacturers in Syria have produced and sold 65 ZT seeders. Some have produced technical brochures explaining the ZT seeders and business cards describing themselves as "ZT seeder manufacturers."

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 less cultivation and stubble burning through less smoke pollution and 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

Improvements in soil, water and atmospheric conservation and sustainability can be expected in the future. From experience elsewhere, ZT brings better soil structure, better soil-water dynamics, better nutrient recycling, improved trafficability, less erosion, and the opportunity for increased soil OM and C sequestration. Pollution will 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.

3.4 Communication and dissemination activities

Project Website - the web site has been updated, allowing 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 2009-10, ACIAR/AusAID CIM/2008/027, Development of conservation cropping systems in the drylands of northern Iraq. 35pp.

Piggin, C, A Haddad and Y Khalil (2010). Development and promotion of zero tillage in Iraq and Syria. Proc. European Congress on Conservation Agriculture, Madrid, Spain, 4-7 October 2010. pp. 653-659.

Piggin, C, A Haddad and Y Khalil (2010). Development and promotion of zero tillage in Iraq and Syria. Paper and presentation at the International Conference on Agricultural Productivity Increase: Challenges and Means of Development, Der-Azzor, Syria, 28-30 November 2010.

Conservation cropping/zero tillage film

The project collaborated with Syrian Extension and Research Directorates in Damascus to develop an extension/demonstration film for TV to raise farmer awareness of conservation cropping and its benefits for local agriculture. Footage was shot several times during the growing season in farmer fields and ICARDA research plots where ZT was being used. Project staff provided technical information and interviews. The film, in Arabic and widely applicable in the region, runs for 18 minutes and is a nice mix of technical information, interaction with farmers and good footage. It was broadcast regularly on Syrian TV at the start of 2010-11 cropping. DVDs were widely distributed to Iraqi trainees and other visitors, and sent to other regions and projects including the ACIAR-AusAID North Africa CA project. An English version is being developed.

Publicity in Australian media

The project has continued to create interest in Australia. With support from the Crawford Fund (Cathy Reade), two Australian journalists visited ICARDA (Kendall Jackson, ABC Rural, 26Jun-1Jul10; Fiona McDonald, Cosmos Science Magazine, 27Sept-3Oct10) and produced many interviews and articles. Those pertaining to the project were:

ABC

Australia is helping farmers in Iraq and Syria increase their grain production by introducing no-till practices.
<http://www.abc.net.au/rural/content/2010/s2952412.htm>

Played on ABC North and West Rural Report, and ABC Country Hour in each State, ABC Country Breakfast and Radio National Rural Reporter

Australian agronomist Colin Piggin explains more about farms and farming in Syria

<http://www.abc.net.au/rural/content/2010/s2952412.htm>

Played on ABC North and West Rural Report, and ABC SA Country Hour

Stunning Simplicity in Syria

<http://www.abc.net.au/rural/sa/content/2010/07/s2951333.htm>

Played on ABC SA Country Hour

Syrian Farming a lot different to Australia

<http://www.abc.net.au/rural/regions/content/201007/2950694.htm?>

Played on ABC North and West Rural Report and ABC West Rural Report

Visiting local farmers in rural Syria

<http://www.abc.net.au/rural/content/2010/s2952412.htm>

Played on ABC North and West Rural Report, and ABC SA Country Hour

COSMOS Science magazine

Article on conservation cropping planned for August 2011 during National Science Week

Ninevah, Iraq

After hearing about the technology, an American Provincial Recovery Team (PRT) with funding from the American Ambassador, obtained 14 ZT seeders from Shibley Engineering in Syria, facilitated by DOA and ICARDA, and located them around Twajna village in Hamdania District, where few farmers knew about ZT technology. Drs AIRijabo

and Saad Abdul Jabbar from UniMosul visited Twajna on 8Jan11 to discuss and provide training on ZT cropping and seeder set-up and calibration. Farmers (19) attending the training were highly satisfied with the information and practical experience received, according to the post-training PRT evaluation survey. This is good transfer of technology and project outcomes and impacts (information, ZT seeders, ZT uptake) to other groups.

Under a new MOA program to extend conservation cropping to 4 Governorates in north and central Iraq, a group of 11 technical staff and farmers from Anbar and Kirkuk and 4 technical staff and farmers from Wasit, visited Ninevah to discuss and inspect developments and experiences with ZT systems, under direction and support from the Minister of Agriculture, Mr Ezz al-Din Abdullah Aldawie, and Ministerial Adviser, Dr Faisal Rachid Nasser. Project staff from UniMosul, DOA and SBAR Ninevah arranged presentations and inspections of research, development and farmer activity in Mosul, AlNamroud, Alqush and Telkief on 14-22May11. The Ninevah team advised they were ready to organise field visits/days and demonstrations in provinces wanting to test ZT technology. In a survey at the end of the visit, all participants were highly satisfied with presentations, inspections and discussion, and expressed keenness to learn more and apply ZT technology. This is good transfer of technology and project impact on MOA and other groups.

Many lectures on the project and on conservation cropping as a whole were presented to visiting trainee groups in the MOA Training and Rehabilitation Center, Baghdad, by Center Director and project economist, Dr. Saad Hatem.

Some 100 farmers, engineers and students staff from Ninevah, Anbar, Kirkuk and Wasit attended field days on conservation cropping in Namroud (60 attendees) on 14 May, Al-Kosh (30 attendees) on 15 May and Wasit (14 attendees) on 22 May.

ICARDA, Syria

Linked farmer demonstrations were conducted in 11 locations in Syria in a participatory collaboration with the Syrian Department of Extension, GCSAR, Aga Khan, SYLICO, Aleppo Machinery Training Center, seeder makers and farmers. The program was reviewed at a meeting on 5Aug10 at ICARDA with 81 collaborators, discussing last year's experiences and results and planning for 2010-11. As in 2009-10, a local ZT seeder was placed in each location and 20-40 farmers encouraged, without charge or payment, to try ZT. Some 450+ farmers grew 15,000ha of ZT crops. Autumn field days were held at nine Aga Khan sites around Salamiya in Oct-Nov10. Thirty collaborators visited ICARDA on 1Jun11 for presentations and inspections of research trials, with farmers and extension officers all very interested to see clear benefits of ZT, early planting and low seed rates.

Many visitors to ICARDA inspected, discussed, and received seminars on the conservation cropping R&D being undertaken by the project and visited collaborating farmers and ZT seeder manufacturers. This included many University groups. Some important visitors were:

- Mr Athel Abdulaziz Al Nujaify, Governor of Ninevah, on 1Aug10, who was impressed with the potential of ZT and has provided \$300,000 of Governorate funds to the project Dr Abdulsattar Alrijabo) for seed production and ZT seeder manufacture in Ninevah
- Iraqi delegation from MOA (7), Ministry of Water Resources (1) and Australians (5) from Rural Solutions SA and the Australian Embassy Baghdad, on 27Sept11, during a planning meeting for AusAID On-the-Ground (OTG) project
- Drs Joel Thorpe and David Swete Kelly, AusAID, on 27-28Feb11, to inspect and discuss progress with the project
- Dr Mehmet Mehdi Eker, Minister of Agriculture, Turkey and delegation, on 24Mar11, to inspect ICARDA research and collaboration

- Mr Abdalla Al-Dardari Deputy Prime Minister Economic Affairs, Mr Erfan Ali, Head Regional Planning Commission, and delegation, on 26Mar11, during a workshop on Syrian rural development prospects
- Dr David Malone, President, and Dr Hammou Laamrani, Senior Program Officer, IDRC
- Drs Faisal Rachid Nasser, Ministerial Adviser, Raad and Sahar from MOA Baghdad, on 5Apr11
- Dr Riad Hejab, Minister of Agriculture and Agrarian Reform, and delegation, on 12May11
- Directors and scientists (18) from Indian and Nepalese R&D institutions in Delhi, Kanpur, Hyderabad, Karnal, Jodpur, Raipur, West Bengal, Jhansi and Nepal, on 24May11
- collaborating extension officers and farmers (30), involved in the project's Syrian extension program, on 1June11

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 the 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, continue to provide a strong foundation and confidence for wide adoption and impact.

4 Training activities

ICARDA Syria

Six training courses/visits were undertaken involving 76 trainees (38 scientists and 5 farmers from Iraq; 10 GCSAR/DOA scientists and 9 farmers from Syria; 2 technicians from Turkey; 3 technicians from Morocco, Tunisia, Algeria; and 9 ICARDA scientists) on:

1. Photography and presentations training course, 19-23Sept10 - 3 Iraqi participants (Organiser: A Varadachary, Communications ICARDA)

Mr Araz Sdk, MOA, Baghdad, Iraq

Mr Durgham Yass, MOA, Baghdad, Iraq

Mr Ahmad Taher, DOA, Ninevah, Iraq

2. Seed Enterprise and Marketing Training Course, 1-11Nov10 - 3 Iraqi participants (Presenters: A Niane, Z Bishaw, A Madarati, ICARDA Seed Unit)

Dr Mostafa Al Tawel, College of Agriculture and Forestry, UniMosul, Mosul, Iraq

Dr Salem Y. Niaamy, College of Agriculture and Forestry, UniMosul, Mosul, Iraq

Mr Zeyad A. M. Al-Najaifi, College of administration and economics, UniMosul, Mosul, Iraq

3. Socio Economic Training Course, 13-24Feb11 - 14 Iraqi and 2 ICARDA participants (Organiser: Saad Hatem, SBAR Baghdad Iraq)

Dr Saad Hatem Mohamed, Head of Training and socio-economist, SBAR, Baghdad, Iraq

Dr Emad Yousef Ismaeel, Assistant Professor, Department of Economics, UniMosul, Mosul, Iraq

Dr Salem Y Niaamy, Economist, College of Agriculture and Forestry, UniMosul, Mosul, Iraq

Mr Abd Al Monem Mohamed Mahmood, Chief of Agriculture Engineers, DOA, Ninevah, Iraq

Mr Ali Safar Ali, Chief of Agriculture Engineers, Tal Abta District, DOA, Ninevah, Iraq

Mr Hussein Ali Mubarak, Chief of Agriculture Extension, Al Namroud District, DOA, Mosul, Iraq

Mr Zeadi Kasim Yahya, Follow up Department, DOA, Mosul, Iraq

Mr Husain Ali Shihab, Al Kosh District, DOA, Mosul, Iraq

Mr Waad Noori Btres, Chief of Agriculture Extension, Al Hamdaniyah District, DOA, Mosul, Iraq

Mr Katit Khodr Alias, Agriculture Engineer, Baashika District, DOA, Mosul, Iraq

Mr Khoshfi Mohamad Mahmood, Chief of Agriculture Engineers, Alshikhan District, DOA, Ninevah, Iraq

Mr Mohamed Khalil Naamo, Chief of Agriculture Extension, Almhalabiya District, DOA, Mosul, Iraq

Mr Abdullah Mohammed Ahmed, Chief of Agriculture Engineers, DOA, Mosul, Iraq

Mr Saad Allah Abdul Kadir Majeed, Chief of Agriculture Extension, Telkief District, DOA, Mosul, Iraq

Mr Atef Haddad, Agronomist, Weed Specialist, ICARDA, Syria

Mr Yaseen Khalil, Research Assistant, ICARDA, Syria

4. Zero Tillage Seeder Training Course, 22-28 Mar11 - 9 Iraqi, 13 Syrian, 2 Turkish, 1 Moroccan, 1 Tunisian, 1 Algerian, 4 ICARDA participants (Organiser-presenter: Dr. Jack Desbiolles, UniSA Australia)

Dr Abdul Sattar Al Rijabo, Assist Professor, UniMosul, Mosul, Iraq

Dr Saad Abdul Jabbar Ismayyir, Assist Professor, UniMosul, Mosul, Iraq

Mr Adel Abdul Wahab Ez Aldin , Mechanical, Chief Engineer, DOA, Mosul, Iraq

Mr Yaseen Mohsen Jaafar, Director, Shihan District, DOA, Mosul, Iraq

Mr Mahmood Diaa Aldin Mustafa, manufacturer and farmer, Mosul, Iraq

Mr Zaid Abdul Salam Mustafa, farmer, Mosul, Iraq

Mr Mafaz Abdul sattar Mohamed, farmer, Mosul, Iraq

Mr Munthir Kashmoula, farmer, Mosul, Iraq

Mr Waad S. Ahmad. farmer, Mosul, Iraq

Mr Ghabriel Shamoun, manufacturer, Qamshili, Syria

Mr George Lahdo, manufacturer, Qamshili, Syria

Mr Saleh Omar, manufacturer, Ein Al Arab, Syria

Mr Mahmoud Abdul Al Khalaf, manufacturer, Al Hasakeh, Syria

Mr Mohamed Al Alo, mechanical engineer, manufacturer and farmer, Al Raqqa, Syria

Mr Ibrahim Al Shbli, manufacturer, Al Bab, Syria

Mr Ismaiel Al Shbli, manufacturer, Al Bab, Syria
Mr Mr. Mostafa Rashid, manufacturer, Al Bab, Syria
Mr Ahmed Khalil, agronomist, SYLICO, Al Hasakeh, Syria
Mr Khaled Saly, agronomist, Qamshili, Syria
Mr Abdul Hamid Alwais, agriculture engineer, Aleppo, Syria
Dr Ziad Kerdi, Professor and engineer, University of Aleppo, Aleppo, Syria
Mr Razouq Gbraiel, farmer, Al Hasakeh, Syria
Dr Cemal Cekic Anadol, Head of Agronomy Department, Anadol, Turkey
Mr Ziya Altinoz Akeller Caddeji, General Manager, Turkey
Mr Najib El Hantaoui, Agriculture Engineer, Morocco
Mr. Mohamed Ali El Hannachi, Engineer, Tunis
Mr Mahfoud Makhlof, Engineer, Algeria
Dr Colin Piggin, head of ACIAR AusAID Iraq Project, ICARDA, Syria
Mr Atef Haddad, agronomist and weed specialist, ICARDA, Syria
Mr Yaseen Khalil, research assistant, ICARDA, Syria
Mr Shukri Ismail, machinery supervisor, ICARDA, Syria

5. Variety Description, Maintenance and Seed Production Course, 3Apr-31July11 (1 Iraqi participant) (Presenters: A Niane, Z Bishaw, A Madarati, ICARDA Seed Unit)

Mr Amar Majeed Mohamed, field seed inspector, State Board for Seed Testing and Certification, Ninevah, Iraq

6. Participatory Extension Training Course 1-5 May 2011 - 13 Iraqi, 6 Syrian, 3 ICARDA participants (Presenter: Dr. Jim Fortune, Principal Consultant, Rural Solution SA, Australia)

Mr Sabah Mikha Dawad, Al Khosh District, DOA, Ninevah, Iraq
Mr Ali Rashid Ali, Baashika District, DOA, Ninevah, Iraq
Mr Salem Hasan Hamo, Agriculture Engineer, DOA, Ninevah, Iraq
Mr Mohammad Ali Hassan, Agricultural Engineer, DOA, Ninevah, Iraq
Mr Osama Saad Abdul Jabbar, Agricultural Engineer, DOA, Ninevah, Iraq
Mr Ramadan Abdullah Slimun, Chief of Agricultural Engineers, DOA, Ninevah, Iraq
Mr Firas U. Diuod, Chief of Agricultural Engineers, DOA, Ninevah, Iraq
Mr Mhana Jaroo Abdul Raman, SBAR Ninevah, Mosul, Iraq
Mr Younis Hamdoun Kasim, Engineer Agro Machinery, SBAR Ninevah, Mosul, Iraq
Mr Khalil Ibrahim Dabo, Engineer, SBAR Ninevah, Mosul, Iraq
Dr Abbas Mahdi Al Hasan, College of Agriculture and Forestry, UniMosul, Mosul, Iraq
Dr Ahmed Mohammed Sultan, Head of Field Crops Department, UniMosul, Mosul, Iraq
Dr Hesham Mahmoud Hassan, Soil and Water Resource Department, UniMosul, Mosul, Iraq
Mr Elias Khouli MAAr Extension Director, Damascus, Syria
Mr Omar Badawi, Chief of Extension Program, Agriculture Department, Idleb, Syria
Mr Abdul Rahman Omar, extension officer, Agriculture Department, Idleb, Syria
Mr Rami Al Ali, Chief of Extension Program, Agriculture Directorate, Homs, Syria
Mr Ibrahim Mohammed, Chief of Extension Program, Agriculture Directorate, Al Raqqa, Syria
Mr Wael Hamzeh, extension officer, Agriculture Directorate, Al Sweida, Syria
Dr Colin Piggin Head of ACIAR AusAID Iraq Project, ICARDA, Syria
Mr Atef Haddad, Agronomist, Weed Specialist, ICARDA, Syria
Mr Yaseen Khalil, Research Assistant, ICARDA, Syria

Australia

Eleven Iraqis and 2 Syrians travelled to Australia on study visits and post-graduate training:

1) participatory extension – zero tillage study visit to Australia 20 Aug - 29 Sept10 - 6 Iraqi and 2 ICARDA participants

(Organisers: Drs D Abrecht AgWA, K Siddique UniWA, D Coventry UniAdelaide)

Mr Bassam Yehya Qasim, agronomist, DOA, Ninevah, Iraq
Mr Emad Shaker Harmaz, agronomist, DOA, Ninevah, Iraq

Mr Sami Ibrahim Mustafa Jaffal- agronomist, DOA, Ninevah, Iraq
Mr Haji Muhammed Ya'kub, agronomist, DOA, Ninevah, Iraq
Mr Muhana Jaroo Abdulrahman, agronomist, SBAR, Ninevah Iraq
Dr. Mohammed Subhi Moustufa Al-Taweel, Professor, Uni Mosul, Ninevah Iraq
Mr Atef Haddad, agronomist, ICARDA Syria
Mr Chokri Ismail, farm machinery specialist, ICARDA Syria

2) Post graduate training 2011 to 2015

Five post graduate trainees travelled to Australia in Jan-Feb 2011 to commenced English studies and research project proposal development in preparation for enrolment in MSc and PhD studies at the University of Adelaide and University of Adelaide.

The trainees for MSc are:

1. Mahmoud Ahmed Hassan Al Ardeny DOA : GIS/remote sensing - University of Western Australia
2. Mahdi Salih Kheder SBAR: socio-economics - University of Adelaide
3. Ayman Taher Mohsen Al Hobaity DOA : agronomy - University of Western Australia
4. Alaa Fakher Kadham Al-Hameedawi SBAR Al Wadha: salinity - University of Adelaide

The trainee for PhD is:

1. Jamal Abdulfattah Yousuf SBAR Mosul: cereal breeding - University of Adelaide

3) Terminating trainees

Unfortunately, three trainees had difficulty in settling into their studies and returned to Iraq before training was completed. These were:

Weed management study visit, Roseworthy campus - 14May-15 Oct10 (UniAdelaide).
Training terminated/returned to Iraq 18Aug10

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

Conservation cropping PhD - 4June10-July14 (UniWA). Training terminated/returned to Iraq 11Aug10

Mohammed Amin Hajy Ahmed, UniMosul

Unfortunately, these are missed opportunities to gain higher experience, qualifications and skills so important for Iraq. The visits have been expensive, time-consuming and without benefit for all concerned.

5 Intellectual property

While the project is providing a sound basis for rapid adoption of zero tillage cropping and manufacture and sale of zero till seeders by collaborating manufacturers and farmers, we are still aware of value arising from branding. As such, zero till seeders that have been produced for field and farm activities by cooperating manufacturers are marked with the ACIAR-AusAID and ICARDA logo/name. In this way we are providing a clear linkage to the origins of the work and an easy reference point to other information sources available in relation to the project activities. This is proving valuable with the expanding range of interested parties (e.g. US for Iraq, Jordan, Morocco, north Africa in general) seeking to purchase zero tillage seeders and access information about trial activities in broadly similar environments in the Middle East and North Africa.

6 Variations to future activities

None

7 Variations to personnel

Dr Wal Anderson, agronomist, AgWA has retired and been replaced by Dr Doug Abrecht.

Dr Saleh Bader, Project Coordinator, DG SBAR, MOA Baghdad, Iraq has retired and been replaced by Dr Mohammed Zain AlAbdin Raof, DG State Board of Seed Testing and Certification, MOA Baghdad, Iraq

Mr Jaffar Seid has been replaced as Director, Directorate of Agriculture, Ninevah, by Dr. Osama Jameel Saadaldeen

Dr Kasim Khalil has been replaced as Director, SBAR Ninevah, by Mr Ali Jasm

8 Problems and opportunities

Insecurity and difficulties in Iraq continued to make travel and project implementation difficult, as they have been since the project commenced. Despite this, endeavour and progress in Iraq have been excellent.

It was a major advance to get the Australian post graduate training under way in Jan/Feb 11. English levels of the trainees are low and it is considered that the planned 6 months training allowed will not enable them to reach satisfactory levels for University enrolment. English training, including funding, will need to be extended for an extra 6-12 months.

The termination of two 6-month study visits to UniAdelaide and the PhD candidate to UniWA was unfortunate, but considered necessary after meetings and discussions with trainees, University student authorities and supervisors. Unfortunately, these are missed opportunities to gain higher experience, qualifications and skills so important for Iraq. The visits have been expensive, time-consuming and without benefit for all concerned. The UniWA PhD opportunity will be reconsidered upon the nomination of new candidates fulfilling required selection criteria.

Recent unrest in Syria is causing disruptions. Several Australians have been unable to travel to ICARDA for training courses, resulting in a planned June statistics course being cancelled. Meetings involving Australians from AusAID and collaborating institutions have had to be transferred to Amman, Jordan, which is more expensive and less convenient than ICARDA, where there are facilities, support and active field sites.

9 Budget

Transfers from Australia were \$1,051,508 in September 2010 and \$401,936 in February 2011. Expenditure from July 2010 to mid-June 2011 was \$1,355,796. The fund balance as of mid-June 2011 was \$418,657.

There is a commitment of the final fund transfers to Australian institutions totalling \$217,000 (University of Western Australia \$79,800; University of Adelaide \$79,800; Department of Agriculture Western Australia \$57,397). These have not yet been made.

The balance of operating funds as of mid-June was \$201,657.

All funds for Iraq have been expended. There was a cash transfer to the University of Mosul Ninevah (\$22,000) for zero tillage seeder modification in August 2010 and a bank transfer to MOA Baghdad (\$200,000) in November 2010 to support 2010-11 field activity.