

Appendix 1 - Journal Articles

The following list covers journal articles published in 2005 by ICARDA researchers, many of them in collaboration with colleagues from national programs. A complete list of publications, including

book chapters and papers published in conference proceedings, is available on ICARDA's web site: www.icarda.org.

- Abd-El-Moneim, A.M., M. Baum, and A. Larbi. 2005. Grasspea research at ICARDA: current status and future strategy. *Journal of Food, Agriculture and Environment* 3 (2): 345.
- Abdel Ghani, A.M., H.K. Parzies, S. Ceccarelli, S. Grando, and H.H. Geiger. 2005. Estimation of quantitative genetic parameters for outcrossing-related traits in barley. *Crop Science* 45 (1): 98-105.
- Abidou, H., S. Valette, J.P. Gauthier, R. Rivoal, A. El-Ahmed, and A. Yahyaoui. 2005. Molecular polymorphism and morphometrics of species of the *Heterodera avenae* group in Syria and Turkey. *Journal of Nematology* 37 (2): 146-154.
- Abidou, H., A. El-Ahmed, J. Nicol, N. Bolat, R. Rivoal, and A. Yahyaoui. 2005. Occurrence and distribution of species of the *Heterodera avenae* group in Syria and Turkey. *Nematologia Mediterranea* 33: 195-201.
- Al Yassin, A., S. Grando, O. Kafawin, A. Tell, and S. Ceccarelli. 2005. Heritability estimates in contrasting environments as influenced by the adaptation level of barley germplasm. *Annals of Applied Biology* 147: 235-244.
- Alary, V. and M. El-Mourid. 2005. Food policies of Maghreb and their effects on the agropastoral societies. *Les politiques alimentaires au Maghreb et leurs conséquences sur les sociétés agropastorales*. *Revue Tiers Monde* 36 (184): 785-810 (in French).
- Aquino de Muro, M., S. Elliott, D. Moore, B.L. Parker, M. Skinner, W. Reid, and M. El Bouhssini. 2005. Molecular characterization of *Beauveria bassiana* isolates obtained from overwintering sites of sunn pests (*Eurygaster* and *Aelia* species). *Mycological Research* 109 (3): 294-306.
- Barrios, E., J.G. Cobo, I.M. Rao, R.J. Thomas, E. Amezcua, J.J. Jimenez, and M.A. Rondon. 2005. Fallow management for soil fertility recovery in tropical Andean agroecosystems in Colombia. *Agriculture, Ecosystems and Environment* 110 (1-2): 29-42.
- Bekele, E., S. Kumari, K. Ali, A. Yusuf, K.M. Makkouk, M. Aslake, M. Ayalew, G. Girma, and D. Hailu. 2005. Survey of viruses affecting legume crops in the Amhara and Oromia regions of Ethiopia. *Phytopathologia Mediterranea* 44 (3): 235-246.
- Chabane, K., G.A. Ablett, G.M. Cordeiro, J. Valkoun, and R.J. Henry. 2005. EST versus genomic derived microsatellite for genotyping wild and cultivated barley. *Genetic Resources and Crop Evolution* 52 (7): 907-913.
- Choo, T.M., B. Vigier, K.M. Ho, S. Ceccarelli, S. Grando, and J.D. Franckowiak. 2005. Comparison of black, purple, and yellow barleys. *Genetic Resources and Crop Evolution* 52: 121-126.
- Eberbach, P.L. and M. Pala. 2005. Crop row-spacing and its influence on the partitioning of evapotranspiration by winter-grown wheat in northern Syria. *Plant and Soil* 268 (1): 195-208.
- Einfeldt, C.H.P., S. Ceccarelli, S. Grando, A. Gland-Zwerger, and H.H. Geiger. 2005. Heterosis and mixing effects in barley under drought stress. *Plant Breeding* 124(4): 350-355.
- El-Haramein, F.J. and H. Nakkoul. 2005. Predicting nutritional and antinutritional components in grasspea by near infrared reflectance (NIRS). *Journal of Food, Agriculture and Environment* 3 (2): 347.
- Gahoonia, T.S., O. Ali, A. Sarker, M.M. Rahman, and W. Erskine. 2005. Root traits, nutrient uptake, multi-location grain yield and benefit-cost ratio of two lentil (*Lens culinaris Medikus*) varieties. *Plant and Soil* 272 (1/2) 153-161.
- Grando, S., M. Baum, S. Ceccarelli, A. Goodchild, F. Jaby El-Haramein, A. Jahoor, and G. Backes. 2005. QTLs for straw quality characteristics identified in recombinant inbred lines of a *Hordeum vulgare* × *H. spontaneum* cross in a Mediterranean environment. *Theoretical and Applied Genetics* 110 (4): 688-695.
- Gul, A., F. Rida, A. Aw-Hassan, and O. Buyukalaca. 2005. Economic analysis of energy use in ground-water irrigation of dry areas: A case study in Syria. *Applied Energy* 82: 285-299.
- Haddad, N., M. Singh, and Q. Mamdouh. 2005. On-farm evaluation of improved barley production technology packages in Jordan. *Jordan Journal of Agricultural Sciences* 1 (1): 1-11.
- Hamwiah, A., S.M. Udupa, W. Choumane, A. Sarker,

- F. Dreyer, C. Jung, and M. Baum. 2005. A genetic linkage map of *Lens* sp. based on microsatellite and AFLP markers and the localization of *Fusarium* vascular wilt resistance. *Theoretical and Applied Genetics* 110: 669-677.
- Ibrikci, H., J. Ryan, A.C. Ulger, G. Buyuk, B. Cakir, K. Korkmaz, E. Karnez, G. Ozgenturk, and O. Konuskan. 2005. Maintenance of phosphorus fertilizer and residual phosphorus effect on corn production. *Nutrient Cycling in Agroecosystems* 72 (3): 279-286.
- Jubrael, J.M.S., S. Udupa, and M. Baum. 2005. Assessment of AFLP-based genetic relationships among date palm (*Phoenix dactylifera* L.) varieties of Iraq. *Journal of the American Society for Horticultural Science* 130 (3): 442-447.
- Katerji, N., J.W. Van Hoorn, A. Hamdy, M. Mastrorilli, and T. Oweis. 2005. Salt tolerance analysis of chickpea, faba bean and durum wheat varieties: I. Chickpea and faba bean. *Agricultural Water Management* 72 (3): 177-194.
- Katerji, N., J.W. Van Hoorn, A. Hamdy, M. Mastrorilli, M.M. Nachit, and T. Oweis. 2005. Salt tolerance analysis of chickpea, faba bean and durum wheat varieties: II. Durum wheat. *Agricultural Water Management* 72 (3): 195-207.
- Katerji, N., J.W. Van Hoorn, C. Fares, A. Hamdy, M. Mastrorilli, and T. Oweis. 2005. Salinity effect on grain quality of two durum wheat varieties differing in salt tolerance. *Agricultural Water Management* 75 (2): 85-91.
- Kiros-Meles, A., S. Udupa, M.M. Abang, H. Abu Blan, M. Baum, S. Ceccarelli, and A.H. Yahyaoui. 2005. Amplified fragment length polymorphism among *Rhynchosporium secalis* isolates collected from a single barley field in Syria. *Annals of Applied Biology* 146: 389-394.
- Kiros-Meles, A., A.H. Yahyaoui, H. Abu Blan, S. Udupa, and M. Baum. 2005. Genetic and virulence diversity in a Jordanian field population of *Rhynchosporium secalis* on barley. *Arab Journal of Plant Protection* 23 (2): 134-140.
- Kugbei, S., B.R. Gregg, N. Wassimi, and A.J.G. Van Gastel. 2005. Socioeconomic features, food security status and seed needs of farming households in Afghanistan. *Journal of New Seeds* 7 (1): 53-70.
- Kumari, S.G., I. Muharram, R. El-Pasha, W.A. Al-Motwkel, and A. Al-Ansi. 2005. First report of viruses that naturally infect alfalfa and fenugreek, and of Beet western yellows virus that infects legume crops in Yemen. *Arab Journal of Plant Protection* 23 (1): 56-57 (in Arabic, English summary).
- La Rovere, R., P. Hiernaux, H. Van Keulen, J.B. Schiere, and J.A. Szonyi. 2005. Co-evolutionary scenarios of intensification and privatization of resource use in rural communities of south-western Niger. *Agricultural Systems* 83: 251-276.
- Malhotra, R.S., A.M. Nassif, K.B. Singh, and G. Khalaf. 2005. Registration of 'Ghab 4' kabuli chickpea cultivar. *Crop Science* 45: 2653.
- Medini, M., S. Hamza, A. Rebai, and M. Baum. 2005. Analysis of genetic diversity in Tunisian durum wheat cultivars and related wild species by SSR and AFLP markers. *Genetic Resources and Crop Evolution* 52: 21-31.
- Mishra, S.K., A. Sarker, B.B. Singh, B. Basandrai, and A.K. Basandrai. 2005. Slow rusting and its potential donors for resistance in lentil (*Lens culinaris* Medik.). *Indian Journal of Genetics and Plant Breeding* 65 (4): 319-320.
- Mustafa, O., H. Kayyal, and M. Nachit. 2005. The relationship between high yield potential and grain quality properties in durum wheat. *Damascus University Journal for the Agricultural Sciences* 21 (2): 304-321.
- Naji, I., H. Kayyal, and S. Ceccarelli. 2005. A study of the performance of different barley genotypes (pure lines, mixtures, populations) under Breda station conditions, Zone III area. *Damascus University Journal for the Agricultural Sciences* 21 (2): 254-275.
- Nassif, A.M., R.S. Malhotra, K.B. Singh, and G. Khalaf. 2005. Registration of 'Ghab 5' kabuli chickpea cultivar. *Crop Science* 45: 2652.
- Oweis T. and A. Hachum. 2005. Water harvesting for agriculture in the dry areas. *Journal of Agricultural investment*. Vol 3. pp 50-58 (in Arabic).
- Oweis, T., A. Hachum, and M. Pala. 2005. Faba bean productivity under rainfed and supplemental irrigation in northern Syria. *Agricultural Water Management* 73 (1): 57-72.
- Pande, S., K.H.M. Siddique, G.K. Kishore, B. Bayaa, P.M. Gaur, C.L.L. Gowda, T.W. Bretag, and J.H. Crouch. 2005. Ascochyta blight of chickpea (*Cicer arietinum* L.): A review of biology, pathogenicity, and disease management. *Australian Journal of Agricultural Research* 56 (4): 317-332.
- Porter, D.R., C.A. Baker, and M. El-Bouhssini. 2005. Resistance in wheat to a new north American-Russian wheat aphid biotype. *Plant Breeding* 124: 603-604.

- Qadir, M., A.D. Noble, J.D. Oster, S. Schubert, and A. Ghafoor. 2005. Driving forces for sodium removal during phytoremediation of calcareous sodic and saline sodic soils: a review. *Soil Use and Management* 21: 173-180.
- Rashid, A., Z.I. Awan, and J. Ryan. 2005. Diagnosing phosphorus deficiency in spring wheat by plant analysis: proposed critical concentration ranges. *Communications in Soil Science and Plant Analysis* 36 (4-6): 609-622.
- Rodriguez, A. and R. Alvarez. 2005. Uso multiple del bosque seco del norte del Peru: Analisis ingreso y autoconsumo. *Zonas Aridas* 9: 162-183 (in Spanish).
- Rodriguez, A., R. Alvarez, and M. Uhlenbrock. 2005. Poverty and natural resource degradation: Agropastoralism in the northern coast of Peru. *Zonas Aridas* 9: 93-120.
- Rodriguez, A. and M. Uhlenbrock. 2005. Evaluacion de la productividad primaria neta arborea potencial y la arquitectura vegetal para una mejor produccion caprina en le departamento de piura. *Zonas Aridas* 9: 184-211 (in Spanish).
- Sabaghpour, S.H., R.S. Malhotra, and T. Banai. 2005. Registration of 'Hashem' kabuli chickpea. *Crop Science* 45: 2651.
- Sarker, A., W. Erskine, and M. Singh. 2005. Variation in shoot and root characteristics and their association with drought tolerance in lentil landraces. *Genetic Resources and Crop Evolution* 52 (1): 89-95.
- Shideed, K. 2005. Food security and water poverty in the Central and West Asia and North Africa region. *Journal of Agricultural Investment* 3: 35-43.
- Singh, M., A. Sarker, and W. Erskine. 2005. Estimation of heritability using spatial variability models: the case of lentil (*Lens culinaris* Medikus) trials in Syria. *Indian Journal of Genetics and Plant Breeding* 65 (2): 77-83.
- Suleimenov, M., K.A. Akhmetov, Z. Kaskarbayev, and A. Kireyev. 2005. Role of wheat in diversified cropping systems in dryland agriculture of Central Asia. *Turkish Journal of Agriculture and Forestry* 29 (2): 143-150.
- Suleimenov, M.K. and K.A. Akshalof. 2005. An account of crop rotations with no summer fallow on chernozem soils of northern Kazakhstan. *Journal of Agrarian Science, Moscow* 8: 2-8 (in Russian).
- Tadele, A., N.I. Haddad, R. Malhotra, and N. Samarah. 2005. Induced polygenic variability in Kabuli chickpea (*Cicer arietinum* L.) lines. *Crop Research* 29 (1): 118-128.
- Vales, M.I., C.C. Schon, F. Capettini, X.M. Chen, A.E. Corey, D.E. Mather, C.C. Mundt, K. Richardson, J.S. Sandoval-Islas, H.F. Utz, and P.M. Hayes. 2005. Effect of population size on the estimation of barley stripe rust QTL. *Theoretical and Applied Genetics* 11:1260-1270.
- Yilmaz, K., I. Celik, S. Kapur, and J. Ryan. 2005. Clay minerals, Ca/Mg ratio and Fe-Al-oxides in relation to structural stability, hydraulic conductivity and soil erosion in southeastern Turkey. *Turkish Journal of Agriculture and Forestry* 29 (1): 29-37.

Appendix 2 - Graduate Theses Produced with ICARDA's Joint Supervision

Master of Science

Syria, Aleppo University

El-Ashkar, Haitham. 2005. The effect of Mashreq/Magreb project on the development of dry areas (Om Al-Ammad - Hamma, Al-Mahmoudly - Al-Raqqa) in Syria.

168 pp. (In Arabic, English summary).

Haj Hamoud, H. 2005. A socio-economic study of integrated sunn pest management on wheat in Syria. 122 pp. (In Arabic, English summary).

Syria, Tishreen University

Al-Naeb, Husam. 2005. Sustainable management of legumes and fertilization in olive groves, northwest Syria, economic aspects and their impact on decreasing soil erosion and physical and chemical properties of the studied soil. 127 pp. (In Arabic, English summary).

Appendix 3 - Agreements signed in 2005

ICBA/PFU

2 February 2005. Memorandum of Understanding between the International Center for Biosaline Agriculture (ICBA), UAE, and the Program Facilitation Unit (PFU) of the CGIAR Program for Central Asia and the Caucasus hosted by ICARDA at its Regional Office in Tashkent, Uzbekistan

Sudan

16 March 2005. Agreement between the Government of Sudan, Ministry of Science and Technology and ICARDA.

Egypt

1 May 2005. Memorandum of Understanding between Ain Shams University and ICARDA.

Hashemite Kingdom of Jordan

1 May 2005. Memorandum of Understanding between the Jordan University of Science and Technology (JUST), and ICARDA.

Kingdom of Saudi Arabia

May 2005. Memorandum of Understanding between the Ministry of Agriculture and ICARDA.

28 June 2005. Memorandum of Understanding between the University of Jordan and ICARDA.

Jordan, Lebanon, the Palestinian National Authority and Syria

29 June 2005. Regional Alliance for Promoting Conservation of Agrobiodiversity and Exchange of Genetic Resources between the Ministries of Agriculture of Jordan, Lebanon, the Palestinian National Authority and Syria (ICARDA is a witness).

United Nations

29 June 2005. Memorandum of Understanding between the United Nations Development Program/Program of Assistance of the Palestinian People (UNDP/PAPP).

Arab Authority for Agricultural Investment and Development

26 September 2005. Memorandum of Understanding between the Arab Authority for Agricultural Investment and Development (AAAID) and ICARDA.

Association of Agricultural Research Institutions in the Near East and North Africa

23 October 2005. Memorandum of Understanding between ICARDA and the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) and ICARDA.

Syria

15 November 2005. Memorandum of Understanding between Aleppo University and ICARDA.

Iraq

17 November 2005. Memorandum of Understanding between the University of Dhouk and ICARDA.

Mexico

5 December 2005. Memorandum of Understanding between the International Maize and Wheat Improvement Center (CIMMYT) and ICARDA.

Appendix 4 - Restricted-Fund Projects

ICARDA's research program is implemented through six Mega-Projects, as detailed in the Center's Medium-term Plan. Restricted-fund project activities are supported by restricted funding that is provided separately from the Center's unrestricted core funding. Restricted funding includes donor-attributed funding (core funds allocated by the donor to specific activi-

ties) and project-specific grants. The financial contributions by the respective donors are reported in Appendix 7. Reports on the activities listed are included in the appropriate sections of this Annual Report.

The Restricted-fund Projects operational during 2005 are listed below.

AFESD (Arab Fund for Economic and Social Development)

- Technical assistance to ICARDA's activities in Arab countries (training Arab nationals and support to Arab national programs)
- Sustainable management of natural resources and improvement of major production systems of the Arabian Peninsula
- Options for coping with increased water scarcity in agriculture in West Asia and North Africa
- Developing sustainable livelihoods of agropastoral communities of West Asia and North Africa

ASIAN DEVELOPMENT BANK

- On-farm soil and water management for sustainable agricultural systems in Central Asia
- Enabling communities in the Aral Sea basin to combat land and water resource degradation through the creation of 'bright' spots

AUSTRALIA

ACIAR (Australian Centre for International Agricultural Research)

- Lentil and Lathyrus in the cropping systems of Nepal: improving crop establishment and yield of relay and post-rice-sown pulses in the *terai* and mid-hills
- Genetic resource conservation, documentation and utilization in Central Asia and the Caucasus
- Plant health management for faba bean, chickpea and lentils
- Ensuring productivity and food security through sustainable control of yellow rust of wheat in Asia
- Better crop germplasm and management for improved production of wheat, barley and pulse and forage legumes in Iraq

Cooperative Research Centre for Molecular Plant Breeding

- Post-doctoral Fellow in barley improvement

GRDC (Grains Research and Development Corporation)

- Technologies for the targeted exploitation of the N.I. Vavilov Institute of Plant Industry (VIR), ICARDA and Australian bread wheat landrace germplasm
- CIPAL (Coordinated Improvement Program for Australian Lentils)
- Coordinated improvement of chickpeas in Australia -

Northern Region module

- Faba bean improvement - Northern Region
- Associate Expert in legume pathology
- Collaborative barley breeding for low-rainfall environments
- Durum industry development - Collaboration with ICARDA to accelerate cultivar improvement for adaptation across all production regions

Grain Foods Cooperative Research Centre Ltd

- Genetic manipulation of pulses for improved flavor and color
- Novel germplasm for food and malt (barley products)

AUSTRIA

- Production diversification and income generating options for small-scale resource poor livestock farmers of the dry areas: The case of lamb fattening in WANA

BRAZIL

EMBRAPA (Empresa Brasileira de Pesquisa Agropecuária / Brazilian Agricultural Research Corporation)

- Cooperative activities between ICARDA and EMBRAPA

CANADA

CGIAR-Canada Linkage Funds

- Characterization and Molecular Mapping of Drought Tolerance in Chickpea

Canada Fund for Africa

- Support to research and capacity building activities in Eritrea, Ethiopia, Mauritania and Sudan

Crop Development Centre, University of Saskatchewan

- Off-season evaluation of *Ascochyta* blight reaction in chickpea

CGIAR CHALLENGE PROGRAMS

Generation Challenge Program

- Commissioned research
- Allele mining based on non-coding regulatory SNPs in barley germplasm

Harvest Plus

- Identification of barley germplasm accessions with high concentration of β -carotene, iron and zinc
- Identification of lentil germplasm accessions with high concentration of β -carotene, iron and zinc

Challenge Program on Water and Food

- Improving water productivity of cereals and food legumes in the Atbara river basin of Eritrea.
- Strengthening livelihood resilience in upper catchments of dry areas by integrated natural resources management.
- Improving on-farm agricultural water productivity in the Karkheh river basin, Iran

CGIAR ICT-KM Program

- Utilization of Intelligent Systems for Plant Protection

CGIAR SYSTEMWIDE PROGRAMS

CGIAR Collaborative Program for Central Asia and the Caucasus

- Program Facilitation Unit

Systemwide Livestock Program (SLP)

- Low-toxin grasspea for improved human and livestock nutrition and ecosystems health in drought-prone areas in Asia and Africa

IWMI Comprehensive Assessment Program

- Assessment of water harvesting and supplemental irrigation potential in arid and semi-arid areas of West Asia and North Africa

DENMARK

- Integrated disease management to enhance barley and wheat production in Eritrea.

EC (European Commission)

EC Attributed Funding

- Integrated Gene Management: Conservation, enhancement and sustainable use of agrobiodiversity in dry areas

EC 6th Framework International Cooperation (INCO)

- Mapping adaptation of barley to drought environments (MABDE)
- Improving durum wheat for water use efficiency and yield stability through physiological

and molecular approaches (IDuWUE)

- Consultative Workshop on Participatory Plant Breeding (CONPAB)
- Exploiting the wheat genome to optimize water use in Mediterranean ecosystems (TRITIMED)

ERF (Economic Research Forum) FEMISE Program

- Les obstacles aux transferts technologiques dans les petites et moyennes exploitations agricoles des zones arides et semi arides du Maghreb. Discussion sur les conditions d'amélioration de la productivité en Algérie, Maroc et Tunisie

FAO (Food and Agriculture Organization of the United Nations)

- Applied research to improve and maintain seed quality for fodder shrubs and grass species used for rangeland rehabilitation
- Preparation of the proceedings of the International Sunn Pest Conference and follow-up activities for the development of IPM strategies for Sunn Pest
- Applied research component of project GCP/PAK/095/USA "Food Security/Poverty Alleviation in Arid Agriculture Balochistan - Pilot Project Phase"
- Technical Cooperation Program (TCP) "Training on Orobanche weed management in leguminous crops"
- TCP "Sustainable agriculture practices in the drought affected region of Karakalpakstan"
- TCP "Improvement of cereals, leguminous, oil and forage crops seed production":

Coordination and implementation of activities related to the establishment of an efficient and integrated seed production system

- Expert Group Meeting on Harnessing Biotechnology and Genetic Engineering for Agricultural Development in the Near East and North Africa
- Organization of the North Africa and Nile Valley Workshop on Technical Support to the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) - Creating an "Intersectoral" Dialogue on PGRFA Conservation, Breeding and Seeds
- Organization of the West Asia and Arabian Peninsula Workshop on Technical Support to the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) - Creating an Intersectoral Dialogue on PGRFA Conservation, Breeding and Seeds

FRANCE

CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement)

- Joint appointment of a CIRAD Research Fellow on institutional options for rangeland management

Service of Cooperation and Cultural Action of the French Embassy in the Republic of Yemen

- Supporting rural development and food security in the terraces of Yemen: Adoption of sustain-

able protected agriculture technology for the production of cash crops in the Tazeh Region

GERMANY

- An integrated approach to sustainable land management in dry areas
- Functional genomics of drought and cold tolerance in chickpea and lentil
- Exploration of genetic resources collections at ICARDA for adaptation to climate change

GLOBAL CROP DIVERSITY TRUST

- Inventory of *ex-situ* collections of Annex 1 crops in Central Asia and the Caucasus
- Establishment of a Regional Plant Genetic Resources Information Network for the Central Asia and Caucasus (CAC) Region
- Improving the facilities of genebanks in the CAC Region

GEF (Global Environment Facility) / UNDP (United Nations Development Programme)

- Conservation and sustainable use of dryland agrobiodiversity in Jordan, Lebanon, Syria and the Palestinian Authority

GULF COOPERATION COUNCIL (GCC)

- Development of sustainable date palm production systems in the GCC countries of the Arabian Peninsula

IDRC (International Development Research Centre)

- Strengthening seed systems for food security in Afghanistan
- Institutionalizing participatory plant breeding within national plant breeding systems: costs and benefits
- International Conference on "Promoting community-driven conservation and sustainable use of dryland agrobiodiversity"
- Workshop on "Participatory plant breeding varieties: ownership, access and benefits"
- Recognition, access, and benefit sharing in participatory plant breeding programs in Syria, Jordan, Egypt, Eritrea

IFAD (International Fund for Agricultural Development)

- Sustainable management of natural resources and improvement of major production systems of the Arabian Peninsula
- Program for strengthening research and development to improve marketing of small ruminant products and income generation in dry areas of Latin America
- Program to foster wider adoption of low-cost durum technologies
- Program for enhancing food security in the Nile Valley and Red Sea region: Technology generation and dissemination for sustainable production of cereals and cool-season food legumes
- Technical assistance for accelerated project performance in North Africa

- Small ruminant health - improved livelihood and market opportunities for poor farmers in the Near East and North Africa region
- Community-based optimization of the management of scarce water resources in agriculture in West Asia and North Africa
- Developing sustainable livelihoods of agropastoral communities of West Asia and North Africa
- Social capital assessment in the area of Southern Region Development Project, Tunisia
- Linking the Virtual Information and Communication Centre (VICC) serving Mexico Investment and Grant Projects with FIDAMERICA

IRAN

Scientific and technical cooperation and training.

ITALY

Italy Attributed Funding

- Durum wheat germplasm improvement for increased productivity, yield stability and grain quality
- Barley germplasm improvement for increased productivity
- Food legume germplasm improvement for increased systems productivity: Chickpea improvement

JAPAN

Japan Attributed Funding

- Improvement, intensification and diversification of sustainable crop and livestock production systems in dry areas
- Improving income of small-scale producers in marginal

agricultural environments: small ruminant milk production and milk derivatives, market opportunities and improving value added returns

JICA (Japan International Cooperation Agency)

- Third Country Training Program in Crop Improvement and Seed Technology
- Japanese Technical Cooperation Project for Enhancing Human Resources Development in Iraq
- JICA volunteer in research on small ruminant genetic diversity

JIRCAS (Japan International Research Center for Agricultural Sciences)

- Evaluation of drought-tolerant wheat germplasm
- Post-doctoral Fellow in drought physiology

KOREA: Rural Development Administration (RDA), Republic of Korea

Collaboration in barley research

MAURITANIA

- Technical assistance to Project Gestion des Parcours et Developpement de l'Elevage (PADEL)

MOROCCO

Morocco Collaborative Grants Program (MCGP)

- Barley improvement in the arid and semi-arid areas of Morocco
- Introgression of selected genetic disease resistance into durum wheat for the rainfed areas of Morocco
- Reinforcement of plant genetic

resources conservation and utilization at Settat gene bank

- Development of an integrated natural resources management framework for sustainable agriculture in Central Morocco
- Integrated pest management in the cereals /food legumes cropping systems in Morocco

OPEC FUND FOR INTERNATIONAL DEVELOPMENT

- Institutionalization and Scaling-up of Participatory Barley Breeding in WANA
- Sustainable management of natural resources and improvement of major production systems of the Arabian Peninsula
- Community-based research for agricultural development and sustainable resource management in Afghanistan

PAKISTAN

- Cooperation in the applied research component of the Barani Village Development Project (BVDP)

SWITZERLAND

Swiss Agency for Development and Cooperation (SDC)

- Associate Expert in poverty analysis
- Sustainable management of the agropastoral resource base in the Maghreb
- Communal management and optimization of mechanized micro-catchment water harvesting for combating desertification in the East Mediterranean region
- Improving the livelihoods of rural communities and natural resource management in the

mountains of the Maghreb countries of Algeria, Morocco and Tunisia

Swiss Centre for International Agriculture (ZIL), Federal Institute of Technology Zurich (ETHZ)

- Research Fellowship project on improving resistance to barley scald

TURKEY

- Technical assistance to Southeast Anatolia Project Regional Development Administration

UNITED KINGDOM

DFID (Department for International Development) Competitive Research Facility

- Integrated pest management of Sunn Pest in West Asia
- Management of Research in Alternative Livelihoods Fund (RALF), Afghanistan
- Cultivation of mint as a viable alternative livelihood in East and North-East of Afghanistan
- Improved rural incomes in Afghanistan from better production and sales of milk products

UNCCD (United Nations Convention to Combat Desertification)

Global Mechanism of the UNCCD

- Regional Environmental Management Officer, Tashkent
- Development of a facilitation unit for the establishment of a Regional Program for Sustainable Development of the Drylands of West Asia and North Africa

- Regional Program for Sustainable Development of the Drylands of West Asia and North Africa: Inventory of activities and gap analysis

UNCCD Sub-Regional Action Program (SRAP) for West Asia

- Integrated natural resources management programme to combat desertification in Lebanon and Jordan (Pilot Projects)

UNESCO

- Sustainable Management of Marginal Drylands (SUMAMAD) - Khanasser Valley Integrated Research Site, Syria.
- Sustainable Management of Marginal Drylands (SUMAMAD) - Zeuss Koutine site, Tunisia
- Third International SUMAMAD Workshop
- Basic research on the elaboration, elucidation and implementation of the principles for the biological control of Sunn pest populations in Kazakhstan and the Kyrgyz Republic

UNITED STATES OF AMERICA

USAID (United States Agency for International Development) Linkage Funds

- Cooperation with University of California, Davis: Evaluation of pulse genetic resources
- Cooperation with University of Delaware: Using information technology for improving water use efficiency
- Cooperation with Washington State University: Rust and Stemphylium blight resistance in lentil
- Cooperation with University of

- Vermont: Sunn pest biocontrol
- Cooperation with Yale University: Assessing the impact of agricultural research on rural livelihoods and poverty alleviation

USAID Rebuilding Agricultural Markets Program (RAMP), Afghanistan

- Village-based seed enterprise development in Afghanistan
- Demonstrating new technologies in farmers' fields to facilitate rapid adoption and diffusion
- Introducing protected agriculture for cash crop production in marginal and water deficit areas of Afghanistan

USAID Cereal Comparative Genomics Initiative, Sub-contract with Prime Contractor University of Minnesota

- Mining wild barley in the Fertile Crescent: A genomics approach for exploiting allelic diversity for disease resistance in barley

USAID IPM CRSP (Integrated Pest Management Collaborative Research Support Program), Sub-contract with Prime Contractor Michigan State University

- Ecologically-based Participatory and Collaborative IPM Research and Capacity Building Program in Central Asia

USDA/ARS (United States Department of Agriculture/Agricultural Research Service)

- Collection of plant genetic resources in the Central Asian and Caucasus region
- Climatological analysis as a tool

for agricultural decision making in dry areas

- Identifying wheat and barley germplasm resistant to Syrian and United States populations of the Russian Wheat Aphid

USDA/FAS (United States Department of Agriculture/Foreign Agricultural Service)

- Biological diversity, cultural and economic value of medicinal, herbal and aromatic plants

in southern Tunisia

- Biological diversity, cultural and economic value of medicinal, herbal and aromatic plants in Morocco
- Partnership to improve rural livelihoods in West Asia and North Africa through strengthened teaching and research on sheep and goat production.
- GIS for watershed management in the arid regions of Tunisia.
- Research on improving productivity of oats as a priority forage

species in Tunisia

- Biological control of weeds with plant pathogens

WORLD BANK

- Regional initiative for dry land management
- International Assessment of Agricultural Science and Technology for Development (IAASTD), CWANA Sub-global Component

Appendix 5 - Collaboration with Advanced Research Institutes and Regional and International Organizations

CGIAR centers and regional/international organizations

ACSAD (The Arab Center for the Studies of Arid Zones and Dry Lands)

- Joint workshops, conferences and training
- Exchange of germplasm.
- Collaboration in integrated natural resource management for combating desertification in Syria, Jordan, Yemen and Lebanon
- Collaboration in conservation and sustainable use of dryland agro-biodiversity in Jordan, Lebanon, Palestinian Authority and Syria.
- Collaboration in regional program for sustainable development of the drylands in WANA

CIAT (Centro Internacional de Agricultura Tropical)

- ICARDA participates in the Systemwide Programme on Soil Water and Nutrient Management (SWNM) and in the Systemwide Programme on Participatory Research and Gender Analysis (PRGA), both coordinated by CIAT
- ICARDA is participating in HarvestPlus (Challenge Program on Biofortified Crops for Improved Human Nutrition), led by CIAT and IFPRI
- CIAT is the managing center for Theme 2 of the Challenge Program on Water and Food and collaborates in the project led by ICARDA on strengthening livelihood resilience in the Karkeh River Basin in Iran

CIHEAM (International Center for Advanced Mediterranean Agronomic Studies)

- Joint training courses and information exchange
- ICARDA is participating in a project on mapping adaptation of barley to drought environments coordinated by CIHEAM
- CIHEAM, ICARDA and FAORNE are co-conveners of the Network on Drought Management for the Near East, Mediterranean and Central Asia (NEMEDCA Drought Network)
- ICARDA is a member of FAO/CIHEAM SARD (Sustainable Agriculture and Rural Development) Mountain Mediterranean Network
- Collaboration in Consultative Workshop on Participatory Plant Breeding
- Study of the tolerance of ICARDA mandate crops to salinity and drought
- Joint supervision of graduate students on improved water management

CIMMYT (International Center for the Improvement of Maize and Wheat)

- An ICARDA barley breeder is seconded to CIMMYT.
- CIMMYT's outreach program in Turkey and ICARDA's Highland Regional Program share facilities in Ankara, Turkey and collaborate with Turkey in a joint Winter and Facultative Wheat Improvement Program
- CIMMYT participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in

Central Asia and the Caucasus, coordinated by ICARDA

- ICARDA is participating in the Generation Challenge Program (Unlocking Genetic Resources in Crops for the Resource Poor) led by CIMMYT and IRRI

CIP (International Potato Center)

- CIP participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA

ESCWA (UN Economic and Social Commission for West Asia)

- Joint publications and seminars on on-farm water use efficiency

FAO (Food and Agriculture Organization of the United Nations)

- ICARDA and FAO are co-sponsors of AARINENA
- ICARDA participates in FAO's AGLINET cooperative library network, AGRIS and CARIS.
- ICARDA cooperates with FAO in the production of the Arabic version of the agricultural multilingual thesaurus AGROVOC
- ICARDA participates in FAO's Global Animal Genetic Resources Program and the FAO/CIHEAM Cooperative Research Network on Sheep and Goats, Genetic Resources Sub-Network
- ICARDA cooperates with the FAO Commission on Plant

Genetic Resources

- Jointly organized regional workshops on “Technical Support to the International Treaty on Plant Genetic Resources for Food and Agriculture: Creating an Intersectoral Dialogue on Plant Genetic Resources Conservation”
- ICARDA is a member of FAO/CIHEAM SARD (Sustainable Agriculture and Rural Development) Mountain Mediterranean Network
- ICARDA participates in the Inter-Agency Task Forces convened by the FAO-RNE (FAO Regional Office for the Near East)
- FAO-RNE, ICARDA and CIHEAM are co-conveners of a Network on Drought Management for the Near East, Mediterranean and Central Asia (NEMEDCA)
- FAO-RNE and ICARDA coordinate the Oat-Vetch Regional Network (REMAV)
- FAO-RNE and ICARDA collaborate in applied research to improve and maintain seed quality for fodder shrubs and grass species used for rangeland rehabilitation
- Collaboration in a project on food security and poverty alleviation in Balochistan, Pakistan
- Collaboration in a Technical Cooperation Program on *Orobanche* control in food legumes

ICBA (International Center for Biosaline Agriculture)

- Collaboration in research on salinity management in Central Asia.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics)

- ICRISAT participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA
- ICARDA and ICRISAT are co-conveners of the Consortium on Desertification, Drought, Poverty, and Agriculture (DDPA)
- ICARDA and ICRISAT are partners in a study of yield gaps within the Comprehensive Assessment of Water Management of the Systemwide Program on Water
- Collaboration in the development and utilization of intelligent systems in plant protection

IFPRI (International Food Policy Research Institute)

- ICARDA is participating in HarvestPlus (Challenge Program on Biofortified Crops for Improved Human Nutrition), led by IFPRI and CIAT
- ICARDA participates in the System Wide Program on Collective Action and Property Rights (CAPRI) coordinated by IFPRI
- IFPRI participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA

IITA (International Institute of Tropical Agriculture)

- ICARDA is participating in the Systemwide Program

on Integrated Pest Management, coordinated by IITA

ILRI (International Livestock Research Institute)

- ICARDA participates in the Systemwide Livestock Program coordinated by ILRI
- ILRI participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA
- ILRI and ICARDA share a joint position on animal epidemiology
- ILRI and ICARDA cooperate in a joint project on small ruminant health, improved livelihoods and market opportunities in the Near East and North Africa

IPGRI (International Plant Genetic Resources Institute)

- ICARDA hosts and services the IPGRI Regional Office for Central and West Asia and North Africa (IPGRI-CWANA)
- ICARDA participates with other CG Centers in the Systemwide Genetic Resources Program, coordinated by IPGRI, in both plant and animal genetic resources
- IPGRI participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA
- ICARDA collaborates with IPGRI in two sub-regional networks on genetic resources (WANANET and CATN/PGR).
- ICARDA participates in development of the SINGER project

coordinated by IPGRI and contributes data to the core SINGER database

- IPGRI-CWANA is a partner with ICARDA in the GEF/UNDP project on "Conservation and sustainable use of dryland agro-biodiversity in Jordan, Lebanon, Palestinian Authority and Syria"

IRRI (International Rice Research Institute)

- IRRI participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA
- ICARDA is participating in the Generation Challenge Program (Unlocking Genetic Resources in Crops for the Resource Poor), led by IRRI and CIMMYT
- IRRI is the Managing Center of ICARDA's projects in Iran and Eritrea within Theme 1 on water productivity of the Challenge Programme on Water and Food
- Collaboration in the development and utilization of intelligent systems in plant protection

IWMI (International Water Management Institute)

- IWMI participates in the CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus, coordinated by ICARDA
- ICARDA is participating in the Challenge Program on Water and Food, coordinated by IWMI
- ICARDA serves on the

Steering Committee of the Systemwide Initiative on the Comprehensive Assessment of Water, coordinated by IWMI.

- IWMI and ICARDA share a joint position on marginal water use
- IWMI and ICARDA are partners in a joint research project on salinity in Central Asia.
- ICARDA is participating in the CGIAR Consortium for Spatial Information - Knowledge Management Project, coordinated by IWMI

UNESCO-MAB (United Nations Education, Scientific and Cultural Organization- Man and the Biosphere Program)

- Collaboration in sustainable land management of marginal drylands

United Nations University, Tokyo, Japan

- Collaboration in sustainable land management of marginal drylands

World Vegetable Center - formerly the Asian Vegetable Research and Development Center (AVRDC)

- AVRDC participates in the CGIAR Consortium for Central Asia and the Caucasus
- Collaboration in horticulture assessment in Asia and the Near East Region

AUSTRALIA

University of Adelaide

- Plant health management for faba bean, chickpea and lentils
- Better crop germplasm, crop management and scientific training for improved production of cereals and legumes in Iraq

CLIMA (Centre for Legumes in Mediterranean Agriculture)

- Development and conservation of plant genetic resources in the Central Asian Republics.
- Preservation of the pulse and cereal genetic resources of the Vavilov Institute
- Improving crop establishment and yield of relay and post-rice-sown pulses (lentil and Lathyrus) in the cropping systems of the *terai* and mid-hills in Nepal
- Development of interspecific hybrids between chickpea and its wild relatives
- Plant health management for faba bean, chickpea and lentils
- Better crop germplasm, crop management and scientific training for improved production of cereals and legumes in Iraq

Cooperative Research Centre (CRC) for Molecular Plant Breeding

- ICARDA is a Supporting Participant (Research)
- Joint training of a PhD student (enrolled in the Southern Cross University)
- Collaborative barley breeding for low-rainfall environments
- Developing elite barley germplasm for salt-stressed environments

Cooperative Research Centre (CRC) for Grain Foods

- Genetic manipulation of pulses for improved flavor and color
- Novel barley germplasm for food and malt

Department of Primary Industry (DPI), Tamworth Centre for Crop Improvement

- Durum wheat improvement.
- Chickpea improvement

- Identification of legume viruses and selection of legume germplasm for virus disease resistance
- Plant health management for faba bean, chickpea and lentils
- Survey of faba bean diseases in Quinghai Province, China

Department of Primary Industry (DPI), Horsham, Victoria

- Coordinated improvement project on Australian lentils
- Development and conservation of plant genetic resources in the Central Asian Republics
- Plant health management for faba bean, chickpea and lentils
- Bread wheat landrace eco-geographic diversity studies

Department of Primary Industries (DPI), Victoria, Knoxfield Center

- Study the molecular variability of nanovirus and luteovirus isolates using PCR and sequence analysis

Land and Food Sciences, University of Queensland

- Collaboration in development of Laboratory Information Management System

Centre for Plant Conservation Genetics, Southern Cross University

- Development of ESTs using wild barley from ICARDA

Plant Breeding Institute, University of Sydney

- Assessment of pathogenic variation in the wheat stripe (yellow) rust pathogen.
- Breeding for resistance to barley stripe (yellow) rust

South Australia Department of Agriculture (SARDI)

- Plant health management for

faba bean, chickpea and lentils

Western Australia Department of Agriculture,

- Plant health management for faba bean, chickpea and lentils
- Better crop germplasm, crop management and scientific training for improved production of cereals and legumes in Iraq

AUSTRIA

Federal Institute for Agrobiology, Linz

- Safety duplication of ICARDA's legume germplasm collection

University of Natural Resources and Applied Life Sciences, Vienna

- Production diversification in small ruminant production

BELGIUM

University of Gent

- Assessment of *Vicia sativa* and *Lathyrus sativus* for neurotoxin content

University of Leuven

- Joint supervision of MSc graduate research on integrated assessment of land degradation
- Cooperation in research on strengthening livelihood resilience in the Karkeh River Basin in Iran

CANADA

Agriculture Canada, Field Crop Development Centre, Alberta

- Development of barley germplasm with multiple disease resistance

Agriculture and Agri-Food Canada

- Collaboration in development of Laboratory Information Management System

University of Guelph, Ontario Agriculture College, Department of Plant Agriculture

- Modeling sustainability of cropping systems based on long-term trials

University of Saskatchewan, Saskatoon

- Genetic improvement of resistance to *Ascochyta* blight and Anthracnose in lentil
- Evaluation of chickpea for *Ascochyta* blight resistance
- Evaluation of chickpea germplasm and their wild relatives for resistance to vascular wilt

DENMARK

Risø National Laboratory, Plant Biology and Biogeochemistry Department

- Genetic mapping in barley
- Barley pathology
- Integrated cereal disease management in Eritrea

Danish Institute of Agriculture Sciences (DIAS)

- Integrated cereal disease management in Eritrea

FRANCE

CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement)

- Joint appointment of a CIRAD Research Fellow on institutional options for rangeland management

Institut National de la Recherche Agronomique (INRA)

- Morphophysiological traits associated with constraints of Mediterranean dryland conditions in durum wheat
- Water balance studies in cereal-legume rotations in semi-arid Mediterranean zone
- Collaboration on cereal cyst nematodes
- Genotyping of crop wild relatives
- Biological control and botanical pesticides against insect pests
- Studies on salt tolerance in cereals and food legumes.
- Evaluating the performance of crop model STICS developed by INRA

L'Institut de Recherche pour le Développement (IRD)

- Cooperation in the establishment of a network on water information

Université de Paris-Sud, Labo Morphogenese Vegetale Experimentale

- Production of doubled haploids in bread wheat and barley

GERMANY

University of Bonn

- QTL analysis in barley
- Integrated approaches to sustainable land management in dry areas
- Joint supervision of PhD graduate research on the use of remote sensing and GIS techniques for land degradation assessment in Syria

University of Frankfurt am Main

- Genomics of cold and drought tolerance in chickpea and lentil

University of Hamburg

- Establishment of a barley transformation system

University of Hannover

- Development of transformation protocols for chickpea and lentil
- Collaboration in research on impact assessment of natural resource management research

University of Hohenheim

- Increasing the heterozygosity level of barley to exploit heterosis under drought stress.
- Joint supervision of PhD graduate research on sustainable management of a wheat-chickpea rotation using a cropping systems simulator

University of Kiel

- Assessment of information needs for development of water management models.
- Institutions of supplemental irrigation
- Development of SSER markers in lentils

University of Leipzig

- Joint supervision of PhD graduate research on *Bedouin* families to identify constraints and opportunities for pastoral development

ITALY

Institute of Nematology, Bari

- Studies of parasitic nematodes in food legumes

Istituto Sperimentale per la Cerealicoltura, Sezione di Fiorenzuola d'Arda

- Collaboration in mapping adaptation of barley to drought environments

University of Tuscia, Viterbo.

- Diversity of storage proteins in durum wheat

University of Tuscia, Viterbo; Germplasm Institute, Bari; ENEA (Italian Research Agency for New Technologies, Energy and the Environment), Rome

- Evaluation and documentation of durum wheat genetic resources

JAPAN

Japan International Research Center for Agricultural Sciences (JIRCAS)

- Comparative genomics and cDNA microarray technology for the identification of drought and cold inducible genes in model plants
- Evaluation of genetic resources and biotechnological approaches for the improvement of wheat germplasm tolerant to environmental stresses

Kyoto University

- Collaboration in molecular characterization of wheat wild relatives

Tottori University

- Collaboration on human resource development programs for arid land sciences

REPUBLIC OF KOREA

Rural Development Administration

- Collaboration in barley research

NETHERLANDS

Wageningen University

- Collaboration on land and water management research in Syria
- Collaboration on internship on technology transfer mechanisms and participatory approaches in dry areas
- Collaboration in international training course on agrobiodiversity and support to local seed supply systems

Department of Plant Science, Laboratory of Plant Breeding, Wageningen

- Collaboration in mapping adaptation of barley to drought environments

PORTUGAL

Estacao Nacional de Melhoramento de Plantas, Elvas

- Developing lentil, faba bean, chickpea, and forage legumes adapted to Portugal's conditions
- Evaluation of IZARIG irrigation management model for supplemental irrigation

RUSSIA

All Russian Institute of Agricultural Biotechnology, Moscow

- Establishment of barley transformation system

The N.I. Vavilov All-Russian Scientific Research Institute of Plant Genetic Resources (VIR)

- Genetic resources exchange, joint collection missions and collaboration in genetic resources evaluation and documentation

- Bread wheat eco-geographic diversity studies

SPAIN

University of Barcelona

- Durum and bread wheat stress physiology
- Barley stress physiology
- Mapping adaptation of barley to drought environments

University of the Basque Country

- Enhancing the productivity of sheep milk production systems and quality of dairy products

University of Cordoba

- Durum grain quality

UdL-IRTA (University of Lleida and Institut de Recerca i Tecnologia Agroalimentaria - IRTA)

- Mapping adaptation of barley to drought environments

SWITZERLAND

Station Fédérale de Recherches Agronomiques de Changins (RAC), Nyon

- Duplication of *Lathyrus* genetic resources and data

Swiss Centre for International Agriculture

- Improving resistance to barley scald

Swiss Federal Institute of Technology (ETH), Animal Nutrition Department

- Feeding systems and quality of sheep milk products

University of Bern

- World Overview of

Conservation Approaches and Technologies (WOCAT)

UNITED KINGDOM

Birmingham University

- Production of *Medicago* and *Lathyrus* field guides

CABI Bioscience

- Entomopathogenic fungi for Sunn pest control

Imperial College London

- Research on microfinance

Macaulay Land Use Research Institute

- Research planning on feeding systems for small ruminant production in the dry areas
- Analysis of long-term rotational trials in sheep and fodder production

Natural Resources Institute, University of Greenwich

- Sunn pest pheromones

Scottish Crop Research Institute

- Mapping adaptation of barley to drought environments

UNITED STATES OF AMERICA

Busch Agricultural Resources Inc

- Development of barley germplasm with multiple disease resistance and enhanced malting quality

University of California, Davis

- Study of genetic diversity in natural populations of *Aegilops* spp
- Evaluation of pulse genetic resources: Collaboration in research on water productivity in Iran

- Collaboration in assessment of horticulture options

Colorado State University

- Testing for stripe rust in barley

Cornell University

- Use of molecular markers for genome mapping and marker-assisted selection for stress resistance in durum wheat

University of Delaware

- Use of information technology for improving water-use efficiency

DuPont Agric. Biotechnology

- Development of EST markers in wheat and lentils

Fort Valley State University, Georgia

- Strengthening teaching and research on sheep and goat production in Tunisia

International Nutritional Foundation

- Analysis of child nutrition among rural households

University of Hawaii:

- Collaborative training program for visiting scientists and graduate research fellows from Iraq

University of Massachusetts

- Child nutrition in rural areas of Syria

Michigan State University / IPM Collaborative Research Support program

- Integrated pest management in Central Asia

University of Minnesota:

- Research on improving pro-

ductivity of oats as priority forage crops

North Carolina State University, Department of Statistical Genetics

- QTL estimation for disease data

Northern Illinois University, Division of Statistics,

- Statistical analysis of microarray data

Oklahoma State University

- Collaboration in feasibility study for sustainable renovation of *qanats* in Syria

Ohio State University

- Collaboration in research on carbon sequestration

Oregon State University

- Molecular mapping of barley within the North America Barley Genome Mapping project.
- Identification of molecular markers associated with resistance to diseases of barley

Purdue University

- GIS for watershed management in the arid regions of Tunisia

University of Missouri, Columbia

- Adaptation to drought and temperature stress in barley using molecular markers

University of Vermont

- Sunn pest biocontrol

University of Wisconsin

- Small ruminant production with emphasis in dairy sheep evaluation and crossbreeding.

- Sheep production in Central Asia

Washington State University

- Rust and *Stemphylium* blight resistance in lentil

USDA/ARS (US Department of Agriculture, Agricultural Research Service)

- Biological diversity, cultural and economic value of medicinal, herbal and aromatic plants in Tunisia and Morocco

USDA/ARS Beltsville Agricultural Research Center, Beltsville, Maryland

- Development of bread wheat cultivars facilitated by microsatellite DNA markers

USDA/ARS, Manhattan, Kansas

- Molecular genetics of Hessian fly

USDA/ARS Plant Stress and Water Conservation Laboratory, Lubbock, Texas

- Climatological analysis as a tool for agricultural decision-taking in dry areas

USDA/ARS Stillwater, Oklahoma

- Russian wheat aphid resistance and biotypes

USDA/ARS Grain Legume Genetics and Physiology Research, Pullman, Washington

- Gene mapping of economic traits to allow marker-assisted selection in chickpea
- Exploitation of existing genetic resources of food legumes
- Inheritance and mapping of rust and *Stemphylium* resistance genes in lentil

**USDA/ARS Plant Science
Research Unit**

- Research on improving productivity of oats as priority forage crops

**USDA/ARS Western Regional
Plant Introduction Station,
Pullman, Washington**

- Conservation of temperate food, pasture and forage legume biodiversity

- Conservation and collection of plant genetic resources in Central Asia and the Caucasus

**United States Wheat and Barley
Scab Initiative**

- Research network for the development of effective control measures that minimize the threat of *Fusarium* head blight (scab)

Yale University

- Collaboration in research on poverty, rural livelihoods and impact analysis
- Collaboration in remote sensing of rangeland degradation and vegetation analysis

Appendix 6 - Research Networks Coordinated by ICARDA

Title	Objectives/Activities	Coordinator	Countries/ Institutions	Donor Support
International & Regional Networks				
International Germplasm Testing Network	Disseminates advanced lines, parental lines and segregating populations of barley, durum wheat, bread wheat, lentil, kabuli chickpea, faba bean, vetches and chicklings developed by ICARDA, CIMMYT, and national programs. Feedback from NARS assists in developing adapted germplasm and provides a better understanding of GxE interaction and of the agroecological characteristics of major production areas.	ICARDA Germplasm Program	52 countries worldwide; CIMMYT	ICARDA Core funds
WANA Plant Genetic Resources Network (WANANET)	Working groups specify priorities in plant genetic resources; identify and implement collaborative projects; implement regional activities.	IPGRI Regional Office for CWANA; ICARDA Genetic Resources Unit	WANA countries; IPGRI; FAO; ACSAD	IPGRI, ICARDA, FAO
WANA Seed Network	Encourages stronger regional seed sector cooperation, exchange of information, regional consultations, and inter-country seed trade.	ICARDA Seed Unit	Algeria, Morocco, Iraq, Cyprus, Turkey, Jordan, Syria, Egypt, Sudan, Libya, Yemen	ICARDA
Agricultural Information Network for WANA (AINWANA)	Improve national and regional capacities in information management, preservation and dissemination.	ICARDA Communication, Documentation and Information Services	WANA countries; CIHEAM	ICARDA
The Network on Drought Management for the Near East, Mediterranean and Central Asia (NEMEDCA Drought Network)	Enhanced technical cooperation among concerned national, regional and international organizations in the Region, particularly the exchange of information and experience among the member countries, on issues concerning drought mitigation.	ICARDA serves as a Secretariat	Countries of the Near East, Mediterranean and Central Asia; FAO; EC; CIHEAM.	ICARDA, FAO, CIHEAM

Appendix 7 - Financial Information

Statement of Activity (US\$X000)

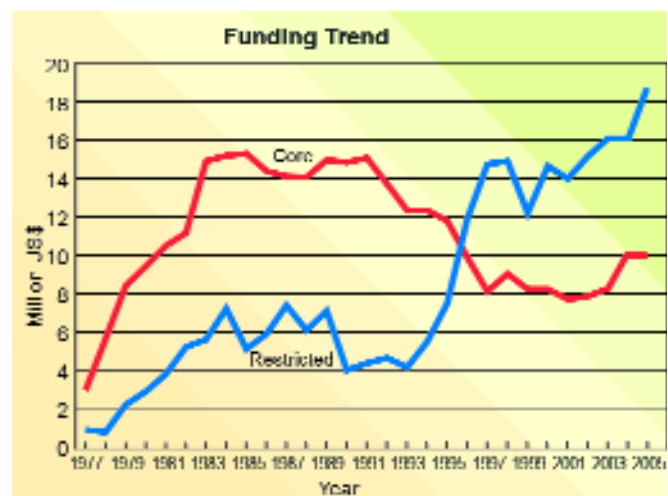
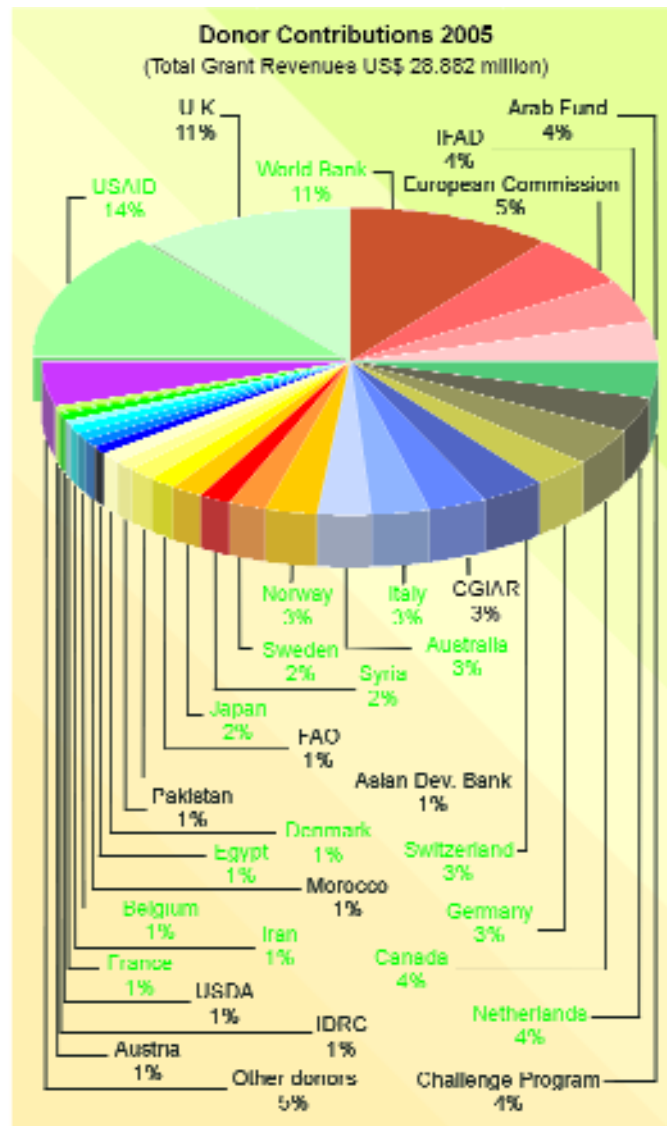
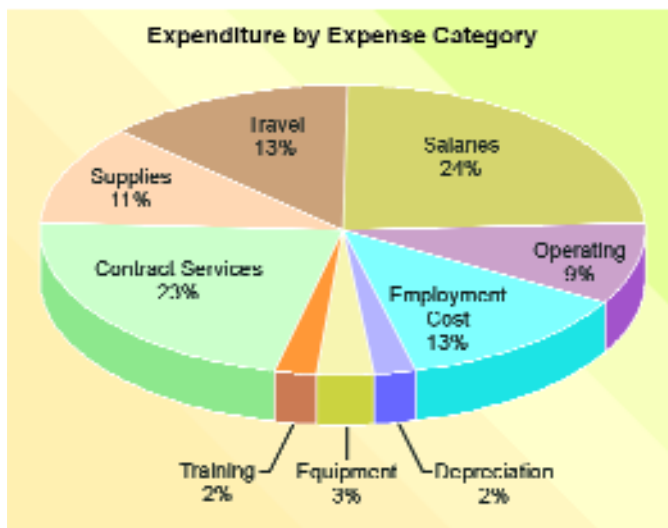
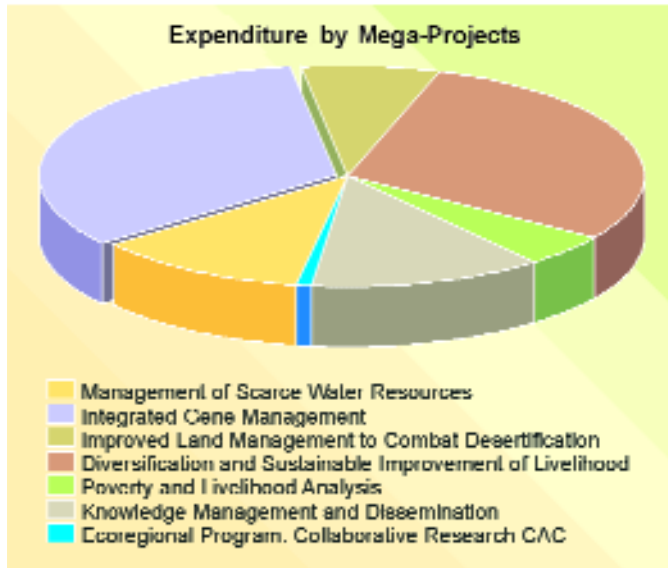
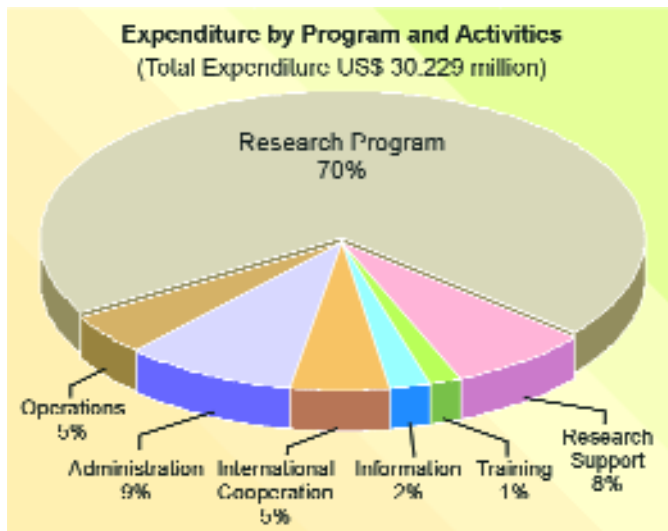
	2005	2004
REVENUES		
Grants (Core and Restricted)	28,882	26,032
Other revenues and gains	932	474
Total	29,814	26,506
EXPENSES AND LOSSES		
Program related expenses	26,772	23,517
Management and general expenses	2,796	3,076
Other losses and expenses	661	44
Total expenses and losses	30,229	26,637
Indirect costs recovery	(898)	(801)
Net expenses and losses	29,331	25,836
EXCESS REVENUES OVER EXPENSES		
	483	670

Statement of Financial Position (US\$X000)

	2005	2004
ASSETS		
Current assets	28,097	26,984
Property & equipment	3,511	2,808
Total assets	31,608	29,792
LIABILITIES AND ASSETS		
Current liabilities	14,752	13,473
Long-term liabilities	4,145	4,091
Total liabilities	18,897	17,564
Net assets	12,711	12,228
Total liabilities & net assets	31,608	29,792

Statement of Grant Revenues 2005 (US\$X000)

Donor	Amount
Arab Fund	1,192
Asian Dev.Bank	363
Australia*	820
Austria	146
Belgium*	230
Canada*	1,078
CGIAR	906
Challenge Program	1,107
China*	70
Denmark*	287
Egypt*	250
European Commission	1,577
FAO	416
France*	215
Germany*	933
Global crop diversity trust	108
GM-UNCCD	123
Gulf Cooperation Council	142
IDRC	151
IFAD	1,287
India*	38
INRA-INRAT	122
Iran*	217
Italy*	880
Japan*	465
JIRCAS	31
Mauritania	100
Miscellaneous	97
Morocco	240
Norway*	763
Pakistan	355
South Africa*	49
Sweden*	583
Switzerland*	931
Syria*	500
The Netherlands*	1,094
The OPEC Fund	69
Turkey	30
UNDP	132
UNEP	45
UNESCO	60
United Kingdom*	3,276
University of Hawaii	108
University of Minnesota	23
USAID*	3,970
USDA	181
World Bank*	3,122
TOTAL	28,882
* Donors that provided core funds	



Appendix 8 - Board of Trustees

On 31 December 2005, the composition of ICARDA's full Board was as follows:

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Chair, Global Water Partnership

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Mr Essam Abd Alla Saleh Abd El-Fattah, *Assistant Director*

Government Liaison

Dr Ahmed El-Ahmed, *Assistant Director General*

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Mr Vijay Sridharan, *Director*

Mr Ahmed El-Shennawy, *Associate Director*

Mr Mohamed Samman, *Treasury Supervisor*

Mrs Imelda Silang, *Finance Officer, Budget, Donor Reporting and Outreach*

Management of Scarce Water Resources and Mitigation of Drought – Mega Project 1

Dr Theib Oweis, *Director*

Dr Adriana Bruggeman, *Agricultural Hydrology Specialist*

Dr Hamid J. Farahani, *Specialist in Irrigation and Water Management*

Dr Manzoor Qadir, *Marginal Water Management Specialist (joint appointment with IWMI)*

Dr Bogachan Benli, *Post-Doctoral Fellow - Irrigation and Water Management*

Mr Kenichi Kawakatsu, *Associate Expert**

Mr Akhtar Ali, *Water and Soil Engineer*

Integrated Gene Management – Mega Project 2

Dr Sanjaya Rajaram, *Director*

Dr Osman Abdalla El Nour, *Bread Wheat Breeder*

Dr Ali Abdel Moneim, *Forage/Legume Breeder*

Dr Michael Baum, *Biotechnologist*
Dr Mustapha El-Bouhssini, *Entomologist*

Dr Flavio Capettini, *Barley Breeder (based at CIMMYT)*

Dr Salvatore Ceccarelli, *Barley Breeder*

Dr Stefania Grando, *Barley Breeder*
Dr Rajinder Malhotra, *Senior Chickpea Breeder*

Dr Miloudi Nachit, *Durum Wheat Breeder*

Dr Ashutosh Sarker, *Lentil Breeder*
Dr Amor Yahyaoui, *Senior Cereal Pathologist*

Dr Mathew Musumbale Abang, *Junior Professional Officer*

Dr Fekadu Fufa Dinssa, *Post-Doctoral Fellow/Barley Breeder*

Mr Fadel Al-Afandi, *Research Associate*

Dr Akinnola Nathaniel

Akintunde, *International Crop Information System and International Nursery Scientist*

Dr Jean Claude Chabane, *Biotechnologist*

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Dr Bassam Bayaa, *Senior Consultant /Legume Pathologist*

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Dr Masanori Inagaki, *JIRCAS Scientific Representative*

Dr Moussa Guirgis Mosaad, *Visiting Scientist*

Dr Sripada M. Udupa, *Biotechnologist*

Ms Sofia Kobakhia, *Visiting Research Fellow**

Dr Kiros Meles, *Visiting Research Fellow**

Genetic Resources Unit

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Dr Bonnie Jean Furman, *Legume Germplasm Curator*

Dr Kenneth Street, *Coordinator - CAC Projects*

Mr Jan Konopka, *Germplasm Documentation Officer*

Dr Siham Asaad, *Head of Seed Health Laboratory*

Mr Bilal Humeid, *Research Associate*

Improved Land Management to Combat Desertification – Mega Project 3

Dr Richard Thomas, *Director*

Dr James A. Tiedeman, *Range Management Scientist*

Dr Francis Turkelboom, *Soil*

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*Conservation/Land
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- Dr Celine Dutilly-Diane, *Socio-economist (joint appointment with CIRAD)*
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 Dr Hanadi Ibrahim El-Dessougi, *Post-Doctoral Fellow (Nutrient and Water Flows)*
 Mr Haben Asgedom Tedla, *Research Fellow**

Diversification and Sustainable Improvement of Rural Livelihoods – Mega Project 4

- Dr Colin Piggin, *Director*
 Dr Luis Iniguez, *Senior Small Ruminant Scientist*
 Dr Mustafa Pala, *Wheat Based Systems Agronomist*
 Dr Asamoah Larbi, *Pasture and Forage Production Specialist*
 Dr Aggrey Ayuen Majok, *Project Coordinator/ Epidemiologist (joint appointment with ILRI)*
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 Ms Azusa Fukuki, *Research Associate*
 Dr Safouh Rihawi, *Research Associate I*
 Ms Monika Zaklouta, *Research Associate*
 Ms Birgitte Larsen Hartwell, *Research Fellow**
 Mr Tsutomu Tamada, *Associate Expert*

Poverty and Livelihoods Analysis – Mega Project 5

- Dr Kamel Shideed, *Director*
 Dr Aden Aw-Hassan, *Agricultural Economist*
 Dr Malika Abdelali Martini, *Socio-*

economist, Community and Gender Analysis Specialist

- Dr Roberto La Rovere, *Researcher in Economics**
 Mr Markus Buerli, *Junior Professional Officer*
 Dr Ahmed Mazid, *Agricultural Economist*
 Dr Tidiane Ngaido, *Property Rights Specialist (joint appointment with IFPRI)**

Knowledge Management and Dissemination for Sustainable Development – Mega Project 6

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 Dr Abdul Bari Salkini, *Agricultural Economist, Liaison Scientist*

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- Dr Eddy De Pauw, *Head*
 Mr Adekunle Gabriel Ibiyemi, *Senior GIS Analyst*

Communication, Documentation, and Information Services

- Dr Surendra Varma, *Head*
 Mr Moyomola Bolarin, *Multimedia Training/Material Specialist*
 Dr Nuhad Maliha, *Library and Information Services Manager*
 Mr Ronald David Kayanja, *Communication Specialist**

Human Resources Development Unit

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 Mr Faik Bahhady, *Consultant*

Computer and Biometrics Services

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 Dr Murari Singh, *Senior Biometrician*
 Mr Hashem Abed, *Scientific Databases Specialist*
 Mr Awad Awad, *Database Administrator and Financial Systems Senior Analyst*
 Dr Fadil Rida, *Applications Specialist (Oracle Financials)*
 Mr Michael Sarkisian, *Senior Maintenance Engineer*
 Mr Colin Webster, *Systems Programmer/Network Administrator*

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 Mr Ahmed Shahbandar, *Assistant Farm Manager*

Purchasing and Supplies

- Mr Essam Abd Alla Saleh Abd El-Fattah, *Manager*

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- Mr Ali Aswad, *Consultant*

International School of Aleppo

- Mr Robert Thompson, *Head*
 Dr Thomas Taylor, *School Head**

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Ms Hana Sharif, *Head*

**Beirut Office/Guesthouse,
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Mr Anwar Agha, *Consultant -
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**Terbol Research Station,
Lebanon**

Mr Munir Sughayyar, *Station
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Regional Programs

**North Africa Regional Program
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**Highland Regional Program,
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Dr Hiroaki Nishikawa, *Consultant*
Mr Bashir Al-Khouri, *Legal
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Mr Tarif Kayyali, *Legal Advisor
(Aleppo)*
Dr Hisham Talas, *Medical
Consultant (Aleppo)*

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Appendix 10 - Acronyms

AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa	CACRP	Central Asia and the Caucasus Regional Program		Iran
ACIAR	Australian Centre for International Agricultural Research, Australia	CATCN	Central Asian and Trans-Caucasian Network	DACAAR	The Danish Committee for Aid to Afghan Refugees
ACSAD	Arab Center for Studies of the Arid Zones and Dry Lands, Syria	CGIAR	Consultative Group on International Agricultural Research	DFID	Department for International Development, UK
ADB	Asian Development Bank, Philippines	CIDA	Canadian International development Agency	ERF-FEMISE	Economic Research Forum-Euro-Mediterranean Forum of Economic Institutes
AfDB	African Development Bank	CIHEAM	Centre International de Hautes Etudes Agronomiques Méditerranéennes, France	EMBRAPA	Brazilian Agricultural Research Corporation
AFESD	Arab Fund for Economic and Social Development, Kuwait	CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo, Mexico	ESCWA	Economic and Social Commission for Western Asia
AGERI	Agricultural Genetic Engineering Institute (Egypt)	CIAT	Centro Internacional de Agricultura Tropical, Colombia	EARO	Ethiopian Agricultural Research Organization
AREO	Agricultural Research and Education Organization, Iran	CIP	International Potato Center, Peru	FAO	Food and Agriculture Organization of the United Nations, Italy
AGERI	Agricultural Genetic Engineering Research Institute, Egypt	CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France	FHCRAA	Future Harvest Consortium to Rebuild Agriculture in Afghanistan
AOAD	Arab Organization for Agricultural Development, Sudan	CLAES	Central Laboratory for Agricultural Expert Systems, Egypt	GAP	Southeastern Anatolia Project, Turkey
APRP	Arabian Peninsula Regional Program	CLIMA	Centre for Legumes in Mediterranean Agriculture, Australia	GEF	Global Environment Facility
AVRDC	Asian Vegetable Research and Development Center (World Vegetable Center)	CNRADA	Centre National de Recherche Agronomique et de développement Agricole, Mauritania	GEF/UNDP	Global Environment Facility/United Nations Development Programme
BMZ	Federal Ministry for Economic Cooperation (Germany)	CWANA	Central and West Asia and North Africa	GFAR	Global Forum on Agricultural Research
CAC	Central Asia and the Caucasus	DARI	Dryland Agricultural Research Institute,	GIS	Geographic Information Systems
CACAARI	Central Asia and the Caucasus Association of Agricultural research Institutions			GOSM	General Organization for Seed Multiplication, Syria
				GTZ	German Technical Cooperation Agency

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, India	IRRI	International Rice Research Institute, Philippines	PPDRI	Plant Pests and Diseases Research Institute, Iran
IDRC	International Development Research Centre, Canada	IWMI	International Water Management Institute, Sri Lanka	SC	Science Council of the CGIAR
IFAD	International Fund for Agricultural Development, Italy	IWWIP	International Winter Wheat Improvement Project	SPIA	Standing Panel on Impact Assessment
IFDC	International Fertilizer Development Center	JICA	Japan International Cooperative Agency, Japan	SPII	Seed and Plant Improvement Institute, Iran
IFPRI	International Food Policy Research Institute, USA	JIRCAS	Japan International Research Center for Agricultural Sciences	SDC	Swiss Agency for Development and Cooperation, Switzerland
IITA	International Institute for Tropical Agriculture, Nigeria	LARI	Lebanese Agricultural Research Institute, Lebanon	TAGEM	Tarimsal Arastirmalar Genel Mudurlugu (Turkey)
ILRI	International Livestock Research Institute, Kenya	MAWR	Ministry of Agriculture and Water Resources, Uzbekistan	UNCCD	United Nations Convention to Combat Desertification
INAT	Tunisian National Institute for Agronomy	M&M	Mashreq and Maghreb	UNDP	United Nations Development Programme
INCO-MED	International Cooperation with Mediterranean Partner Countries (European Union)	MRMP	Matrouh Research Management Project, Egypt	UNEP	United Nations Environment Programme
INRA	Institut National de la Recherche Agronomique, France	NARP	North Africa Regional Program	UNESCO	United Nations Educational Scientific and Cultural Organization
INRAT	National Agricultural Research Institute of Tunisia	NARS	National Agricultural Research Systems	UNU	United Nations University, Japan
IPGRI	International Plant Genetic Resources Institute, Italy	NASA	National Aeronautics and Space Administration, USA	UN/WFP	United Nations/World Food Programme
IPM	Integrated Pest Management	NCARTT	National Center for Agricultural Research and Technology Transfer, Jordan	UPOV	International Union for the Protection of New Varieties of Plants, Switzerland
IRDEN	Regional Program to Foster Wider Adoption of Low-cost Durum Technologies	NGO	Non-Governmental Organizations	USAID	United States Agency for International Development, USA
IRESA	Institution de la Recherche et de l'Enseignement Supérieur Agricoles, Tunisia	NVRSRP	Nile Valley and Red Sea Regional Program	USDA	United States Department of Agriculture, USA
		OECD	Organization for Economic Cooperation and Development	WANA	West Asia and North Africa
		OPEC	Organization of Petroleum Exporting Countries, Austria	WARP	West Asia Regional Program, Jordan

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