



Enhancing Food Security Project in Arab Countries 2011–2023



PARTNER COUNTRIES: ALGERIA, EGYPT, IRAQ, JORDAN, MOROCCO, PALESTINE, SUDAN, SYRIA, TUNISIA, AND YEMEN

MAJOR ACHIEVEMENTS AND IMPACTS

Raising productivity while reducing import dependence in Arab countries

The project adopted different approaches for technology dissemination in rainfed, supplemental, and full irrigation production systems.

- Demonstrating and disseminating improved varieties, efficient use of irrigation water, seed system, and improved agronomic practices that increase farm profitability.
- On-farm adaptive research to fine-tune new production technologies for scaling.

- Capacity strengthening of stakeholders, including farmers, young researchers, and extension officers.
- Assessing the adoption and impact of crop innovation.

Increased wheat productivity

- Using improved production packages, wheat yield increased by 30% in rainfed systems and 29% under supplementary and full irrigation systems.
- Across all countries and production systems, wheat productivity increased by 29%, with the maximum increase reaching 66%.
- Maximum yield achieved by some farmers showed high potential for increasing wheat yields using existing improved innovations and arable land.



Photo 1: Scaling of wheat innovations in partner countries

Barley and food legume

- Barley productivity increased in Jordan (22%), Palestine (25%), Syria (46%), and Tunisia (26%) using improved practices.
- The productivity of faba bean increased by 18% in Syria and 25% in Tunisia.

Seed systems

- Poor access to quality seed is a critical challenge in scaling wheat, barley, and food legume innovations in the partner countries.
- The project supported seed production of high-yielding crop varieties in four project-participating countries.
- **In Jordan**, farmers produced 1,930 tons of quality wheat seeds under the project's supervision. They used 47% for their own planting and 43% for home consumption and to sell as grain.
- **In Palestine**, Seed Production Groups were established, and farmers were provided with seeds of registered wheat varieties and produced 892 tons of seeds under the project's and other partners' technical assistance (Photo 2).

- **In Tunisia**, a network of farmers was established to produce seeds of improved wheat and faba bean varieties. Seed producers also benefited from two seed cleaning and treatment units.
- **In Sudan**, outstanding farmers successfully initiated a seed production business, becoming a major seed supplier to neighboring areas. They benefited from training and early-generation seeds through the project.



Photo 2: Quality seed production and distribution

Improved irrigation system for high crop and water productivity

In the target countries, irrigation water is a scarce resource, and efficient water-saving methods were validated and included in the innovation packages.

Raised bed planting (RB)

The crops are planted on ridges, and irrigation water is applied to the bottom of the furrows. This technology was demonstrated and scaled in Egypt, Morocco, and Syria.

In **Egypt**, the practice revolutionized wheat production in Al-Sharkia, Al Dakahlia, and Al Behera governorates (Photo 3) and gave the following advantages:

- An average grain yield increase of 27%.
- An average saving of 25% irrigation water.
- An average of 73% increase in water use efficiency.
- Reductions in labor and fuel costs.



Photo 3: Raised bed technology in Egypt

In **Morocco**, the RB planting resulted in

- Increased wheat yield by 24%.
- 21% irrigation water saving and 63% improvement in water productivity.

In **Syria**, the RB planting increased wheat yield by 17%.

Drip, deficit and pivotal irrigation

- Drip irrigation is becoming popular in different crops (Photo 4). An increase in wheat productivity using drip irrigation was achieved in Tunisia (26%), Syria (46%), Sudan (18%), Yemen (18%), and Morocco (3%).
- In **Morocco**, using deficit irrigation technology resulted in 30% irrigation water saving and only 3% reduction in wheat yield compared to full supplemental irrigation.
- In **Sudan**, irrigating every 2–3 days interval using pivotal irrigation increased water and wheat productivity.

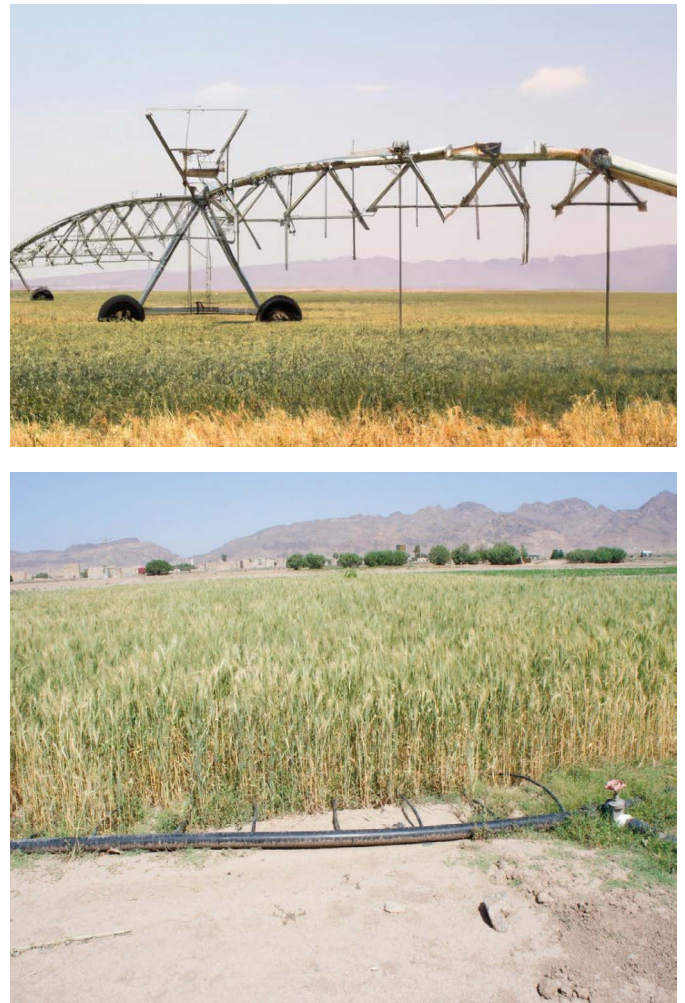


Photo 4: Wheat production using pivotal (top) and drip (bottom) irrigation systems

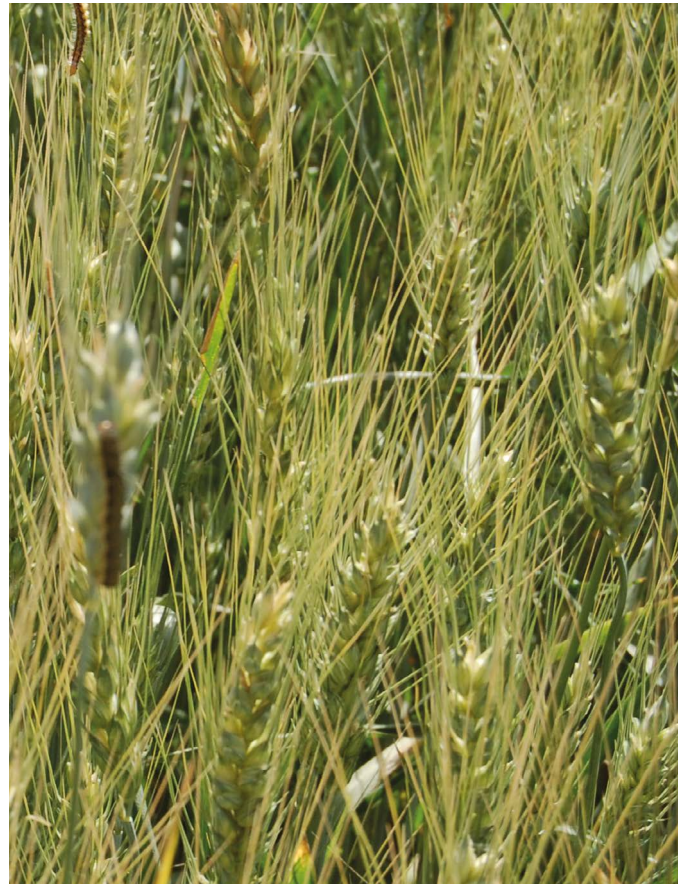
Digitizing irrigation scheduling

- Short Messaging Service (SMS) technology was used to schedule irrigation for wheat crops in Tunisia.
- SMS technology increased wheat yield by 36% for farmers using SMS technology.

Conservation agriculture and legume rotation

Conservation agriculture (CA) is one of the technologies validated in several project partner countries under rainfed conditions.

- Wheat productivity under CA was higher than conventional agriculture. The average yield increases were 53% in Algeria, 12% in Jordan, 25% in Morocco, 13% in Palestine, 16% in Syria, and 13% in Tunisia.
- For barley, the average yield increase was 21% in Syria and 34% in Tunisia.
- For vetch, yield increases of 10% and 13% were obtained in Jordan and Tunisia, respectively.
- For chickpea, the yield increase was 85% in Algeria and 17% in Syria.



ENHANCING FOOD SECURITY PROJECT IN ARAB COUNTRIES

Legume rotation

- In Egypt, rotating wheat with forage legumes such as berseem (Fahl) helped reduce the need to add fertilizer to wheat crops.
- Demonstrations of wheat-Fahl rotation gave green berseem yield of 42.8 t/ha.

Capacity development

- Over 128,000 people benefited from capacity development during the project period, 71% were farmers.
- At the national level, in-country training, field days, farmer field schools, and workshops were organized.

- At the regional level, several knowledge-sharing events promoted interaction among countries. Regional traveling workshops organized in Egypt and Tunisia attended by farmers, extension agents, and national coordinators enhanced interactions among participants in different countries.
- Cross-country visits of scientists and extension agents provided valuable new learning on applying agronomic techniques, improved varieties, modern breeding approaches, and dissemination strategies.
- Regional workshops were organized in the areas of socioeconomics and food wastage and losses assessment.
- Exchanging improved germplasm internationally and among partner countries enhanced the identification and selection of high-yielding and resilient crop varieties.



Investing in the future

- Strengthening the capacity of young scientists helps in achieving long-lasting impact.
- Under the Young Agricultural Scientist Program (YASP), 72 young scientists upgraded their knowledge and expertise across various areas related to wheat production systems.
- An advanced degree training program benefited four scientists in MSc degrees and one in PhD program.

Food loss and waste studies

- The estimated food loss and waste of wheat along the value chain was 20.6% in Egypt and 36.0% in Morocco.
- The highest food losses are in marketing (4.3%) in Egypt and farm management (17.4%) in Morocco.
- Preventing food loss and waste has the potential of feeding additional 50 million people in the two countries and in saving 2.66 billion m³ of water in Morocco and 4.79 billion m³ of water in Egypt.

Adoption and impact

- Adoption and impact assessment was done in Egypt, Sudan, Tunisia, Morocco, and Jordan.
- Adoption levels of improved production packages (composed of improved varieties and at least two other recommended cultural practices) were 79% in Egypt, 48% in Jordan, 35% in Sudan, 33% in Tunisia, and 27% in Morocco.
- A total of 356.5 thousand households with 2.1 million members directly benefited from the project interventions in the five countries.

Return on investment

Every dollar (in 2022 US\$ equivalents) invested by the project earned a return of:

- 46 US\$ in Morocco
- 21 US\$ in Egypt and Tunisia
- 17 US\$ in Sudan
- 13 US\$ in Jordan

Partners:

Institut Technique des Grandes Cultures (ITGC) – ALGERIA

Agriculture Research Center (ARC) – EGYPT

Institut National de la Recherche Agronomique (INRA) – MOROCCO

Office for Agricultural Research (OAR) – IRAQ

National Center for Agricultural Research and Extension (NCARE) – JORDAN

National Agricultural Research Center (NARC) – PALESTINE

Agricultural Research Corporation (ARC) – SUDAN

General Commission for Scientific Agricultural Research (GCSAR) – SYRIA

Institut National des Grandes Cultures (INGC),
Institution pour la Recherche et l'Enseignement Supérieur Agricoles (IRESA) – TUNISIA

Agricultural Research and Extension Authority (AREA) – YEMEN



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