

Transforming deserts into resilient and productive agricultural systems

Introducing the Integrated Desert Farming Innovation Program

Boosting desert farm productivity and creating jobs:

- A new research-to-business partnership to diversify farming and build agri-business value chains
- Innovations, services and capacities to transform desert food production systems

A CGIAR-GCC partnership led by ICARDA – the International Center for Agricultural Research in the Dry Areas – in partnership with the International Water Management Institute (IWMI), International Food Policy Research Institute (IFPRI) and WorldFish.



Realizing the potential of desert farming for food, feed and water security in GCC countries

The Integrated Desert Farming Innovation Program will boost agricultural productivity and create jobs in desert ecosystems. It will create 'public-private-producer' partnerships that build new farming systems, integrate innovative technologies and market-driven value chains and conserve agrobiodiversity.

Supporting GCC countries to transform deserts into productive agricultural systems is the goal of the Integrated Desert Farming Innovation Program.

The livelihoods of the GCC countries' populations are under threat from dwindling water supplies, poor soils, expanding desertification and climate change.

The good news is that these desert lands can be transformed into highly productive and profitable farming systems, by harnessing new practices, and innovations that integrated desert farming offers.

Through the Integrated Desert Farming Innovation Program, a wealth of new agricultural innovations and natural resource management practices is available to all GCC countries. These agricultural 'innovation packages,' will transform the region's desert farming systems – increasing food and feed productivity and creating jobs in an environmental balance.

Benefits for GCC countries and their communities

As a partnership with GCC countries, the Program will help transform their deserts into highly productive and diverse food systems, to deliver:

- **Reduced food and feed imports** thanks to increased local production of strategic staple crops.
- **Lucrative local and export markets** for high-value crops and value-added desert farming products – boosting the small business sector and creating new jobs.
- **Significant water saving and reuse**, with resilient and sustainable farming systems, using renewable energy, and climate-smart farming approaches.

Action & funding plan scenarios: two five-year phases

- **Phase 1: Development and scaling-up innovations and capacity development.** Partners co-develop and test desert farming innovations; scale-up technology packages; share knowledge in the region.
- **Phase 2: Private sector focus and technology transfer.** Transition of Program activities to private sector; enhancing the business model, for economic viability and investment.

Estimated Phase 1 budget: \$10 million over 5 years.

Benefits for GCC partners countries:

After five years, partners in the Integrated Desert Farming Innovation Program can expect a range of positive outcomes, that will continue as the program progresses in the following areas.



Boosting local businesses

Direct positive benefits to 30,000 entrepreneurs across the region; indirect benefits to a further 100,000 households.



Saving water & energy

A 90% reduction in energy consumption; 85% reduction in fresh water use. Converting 10,000 greenhouses to solar energy. Total savings of 42 million cubic meters of water across GCC countries.



Saving fresh water

1 billion cubic meters of fresh water saved yearly – by producing 4 million tons of fodder from native water-efficient Buffel grass, replacing tropical Rhodes grass.



Smart water & nutrient use

Fish farming in 10,000 greenhouses and oases, recycling water up to six times, before discharge as nutrient rich irrigation for crops and fruit tree plantations.



Lower fertilizer costs

Yearly savings of 20,000 tons of purchased fertilizers. Increasing access to natural nutrients to boost dietary diversity and significantly increase nutrition and food security – with organic vermicompost/insect composting technology and Integrated Agriculture-Aquaculture approaches.



Transforming farm waste to nutritious animal feed

A 10% reduction in the animal feed gap. Organic farm residues will produce 100,000 tons of new feed, contributing to a potential yearly reduction of desertification by 10,000 hectares – benefiting water resources, fauna and flora.



Boosting date exports

A 66% increase in the date production reaching global markets, from 1.5 million to 2.5 million tons – applying enhanced farming and quality assurance.

Integrated desert farming in action

Drone technology for liquid pollination of date palm; and for pest monitoring and control



SEASONAL CROPS

Protected Agriculture (e.g. vegetables, fruits, aromatic & medicinal plants)



Remote sensing to measure and monitor cropping systems, trees, plant growth & soil moisture

FRUIT TREES IN OASIS SYSTEMS

Inter-cropping date palm with citrus, fig, pomegranate, jujuba, etc

Sand dune fixation

Open field (e.g. forage)

Water & nutrients for protected crops (solar powered root zone cooling)

Water & nutrients for fruit tree irrigation

Solar-powered date drying

Integrated farm-fish production systems

Water & nutrients for open field irrigation

LIVESTOCK AND FEED PRODUCTION

Spineless cactus for animal feed

Trees for protective screen against wind erosion; reducing crop evapotranspiration

Public private producer partnerships and knowledge sharing

Real-time evapotranspiration measurement for precision irrigation

Solar-powered irrigation pump



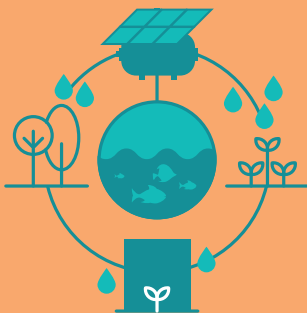
Rotational grazing of improved rangelands



Digital approaches to accelerate the scaling-up of innovative desert farming

For example: satellite remote sensing, 'Internet of Things' technologies, artificial intelligence, modelling, smartphone applications and big data analytics to track environmental change, and to share real-time monitoring data and advice.

Integrated fish-vegetable farming systems



Circular process that delivers high food productivity in desert conditions. Water from fish ponds reused up to six times before discharge as nutrient-rich fertilizer-irrigation water for vegetables, fruit tree and forage production. Producing yearly savings of 2,000 tons of fertilizers.

Integrated farm-animal-feed systems



Transforming farm organic and animal waste into animal feed and nutrient-rich compost.

From farm waste to feed & nutrients



Circular process transforming farm organic waste into proteins and fertilizers with insect farming and microorganism technologies.



ICARDA, the International Center for Agricultural Research in the Dry Areas, is an international organization engaged in research for development. We deliver resilient, climate-smart food systems, by undertaking innovative research-for development. In partnership with governments, research institutions, NGOs, and the private sector, our work advances scientific knowledge, shapes practices, and informs policy. As a member of the CGIAR, ICARDA is the only CGIAR research center headquartered in the non-tropical drylands. Our unique dryland agricultural experience ensures that we provide people-centered solutions integrated directly into farming activities and food systems in climate-vulnerable dry regions of Africa, Asia, and the Middle East.



This program is a **CGIAR**-wide collaborative effort bringing in the expertise of **ICARDA** in drylands agriculture, **IWMI** in water management, **IFPRI** on policy solutions, and **World Fish** in circular agriculture-aquaculture as a CGIAR global research partnership for a food-secure future. CGIAR science is dedicated to transforming food, land, and water systems in a climate crisis. Its research is carried out by a global network of 9,000 researchers and practitioners, in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations, and the private sector.

The project team is happy to answer your questions and open discussions with you on opportunities for transforming the future of farming in your desert areas.
Please contact Abdoul Aziz Niane, ICARDA Regional Coordinator, Arab Peninsula Regional Project: A.niane@cgiar.org.