Green Technology for the Agricultural Sector in the Arab Region

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**Definitions**

**Agriculture** is the work and methods of growing crops and looking after animals that are then used for food.
Art of cultivating the soil, growing crops and raising livestock

**Green Agriculture** uses green technologies that mitigate or reverse the effect of human activity on the environment. Environmentally-sound Technologies, climate-smart technologies
Report Objectives

- Describe the main green agriculture technologies used globally.
- Assess the status of green agriculture in the Arab countries and compare to the rest of the world.
- Address technology transfer mechanisms and opportunities to close the gap between the Arab region and elsewhere.

Focus on the cultivation part of Agriculture
Arab Sub-Regions

**Maghreb**: Algeria, Libya, Morocco and Tunisia

**Mashreq**: Egypt, Iraq, Jordan, Lebanon, Palestine and Syria

**Gulf Cooperation Council (GCC)**: Bahrain, Saudi Arabia, Kuwait, Oman, Qatar and the United Arab Emirates (UAE)

**Least Developed Countries (LDCs)**: Comoros Islands, Djibouti, Mauritania, Somalia, Sudan and Yemen
Over 80% of GCC water used in Agriculture
Agriculture Elements and Processes

Sustainable Green Agriculture

- Equipment
- Management
- Soil
- Crops
- Irrigation
- Animals*

* Not included in the scope of the report
Technologies Description (1/2)

**Renewable Energy**
Provides power and heat

**Vertical Farming**
No soil, less water
- Hydroponics
- Aeroponics
- Aquaponics

**Precision Farming**
Uses satellites and sensors for precise crop management

**Smart Irrigation**
More efficient water use

**Improved/Enhanced Seeds**
Cross pollination or individual seed treatment
Technologies Description (2/2)

Water Recycling & Reuse
Reed Beds
- Direct re-use
- After treatment

Sustainable Soil Management
Improve productivity
Respect environment

Integrated Pest Management (IPM)
Ecosystem-based strategy

Organic Waste Re-use
Composting or fuel production

Biofuels
Oily crops for biodiesel
Sugar-rich crops for bioethanol
# Green Agriculture Technologies Status in the Arab region

<table>
<thead>
<tr>
<th>Sub-region</th>
<th>Support required</th>
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</table>
| **Maghreb** | Technologies available  
Need capacity building and financial support |
| **Mashreq** | Technologies available  
Need capacity building and financial support  
Proper integration with other re-building efforts (many countries in conflict) |
| **GCC**     | Focus areas selected and funding allocated  
Can procure technologies with capacity building |
| **LDCs**    | Most support needed here, from all aspects |

Most technologies can be found in the Arab region, at varying levels of:

- Technology **Maturity**
- **Availability** (differs between countries):
  - Feasibility
  - Affordability
Almost all technologies described are available in the Arab region, at different levels

Some technologies are fully commercialised whilst others are still at pilot stage. In some cases, it never went beyond that stage, mostly due to lack of funding

The main factor that helped in making the technologies available is foreign support, via various agencies and NGO’s

Having the right economic policies and incentives plays a big role in promoting the use of green technologies, as demonstrated clearly by Lebanon’s LWP. Many countries in the region are reviewing their policies in that direction

There are many examples of innovation at a local level. If encouraged, those can make a difference, locally and internationally

In many cases the innovative green technologies-based projects or start-ups were led by young men and women, entrepreneurs or volunteers

Apart from some proprietary technologies, the majority of technologies described are available to use, provided funding and adequate skills are also available. Not expecting any IPR issues
Technologies in particular are widely spread and/or have a huge potential:

- Renewable energy, especially solar PV
- Hydroponics and aquaponics
- Recycling and reuse of greywater
- Soil improvement technologies

All above technologies are a perfect fit for the Arab region, given the type of climate, water scarcity and solar radiation. They represent great opportunities for local communities, including the youth and women.

In all cases, economy of scale can drive costs down.

Recycling and re-use of farm waste does not fulfil its full potential due to lack of finances, lack of awareness and farmers mobilisation.

Naturally, the other technologies also offer job opportunities for Arab youth and women and help address climate change issues. However, most require special skills or considerable upfront investment. Hence, prioritisation becomes very important.
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<th><strong>Local</strong></th>
<th><strong>Regional</strong></th>
<th><strong>International</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within the same country</strong></td>
<td><strong>Within the same region</strong></td>
<td><strong>At international level</strong></td>
</tr>
<tr>
<td>- Generally facilitated by Industry or government entities and can come in the shape of Public-Private-Partnerships (PPP)</td>
<td>- Generally facilitated by both parties’ governments or by regional organizations</td>
<td>- Generally facilitated by international organizations</td>
</tr>
<tr>
<td>- From local research institutions to Industry as in the case of SME incubation programs and University-based IP commercialization units</td>
<td>- Example: Collaboration between Iraq and UAE in biofuel from rotten dates project</td>
<td>- Treaties/agreements, e.g. the Paris Agreement and the Addis Ababa Action Agenda</td>
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<td></td>
<td>- Spin-offs and start-ups collaboration with existing companies</td>
<td>- IP institutions, e.g. JIPA’s GTTP and WIPO GREEN</td>
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<td>- Development banks, e.g. the ADB, the Technology Bank for LDCs and EBRD’s FINTECC program</td>
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<td>- Dedicated international organizations, e.g. FAO and WFP</td>
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<td>- International organizations dedicated to Agriculture R&amp;D, e.g. ICARDA and ICBA.</td>
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<td>- Some developed countries International Development Agencies/ Departments, e.g. USAID and GIZ</td>
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Technology Transfer (TT) Mechanisms (2/2)

For an optimum TT, it is important to **include technical support** and **capacity building**. Procuring just the technology leads to sub-optimal results, at best.

**Enforcing IP rights** is a critical part of TT and cannot be emphasized enough. To benefit from externally-developed technologies, Arab countries must have **legal systems that can adequately protect patents**.

The TT can be offered in the following formats:
- **Free of charge**: Generally offered to developing countries to help them, through customized development programs.
- **Collaboration**: Via joint programs where both parties contribute in cash or in kind.
- **Business transaction**: Simply via buying a needed technology from the owner.

Overall, adopting a **win-win model**, as much as possible, between the provider and the receiver of the technology can make TT easier.
## Technology Transfer Opportunities

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<tr>
<th>Name</th>
<th>Description</th>
<th>Applicability</th>
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<tbody>
<tr>
<td>FEMIP Trust Fund</td>
<td>Part of the European Development Bank, dedicated to offering advisory and capacity building to their Mediterranean Partner Countries</td>
<td>Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine and Tunisia</td>
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<tr>
<td>FINTECC</td>
<td>FINTECC (Finance and Technology Transfer Centre for Climate Change) is part of the EBRD’s contribution towards climate technology transfer to countries in transition. It offers investment, policy and technical support</td>
<td>Egypt, Jordan, Lebanon, Morocco and Tunisia</td>
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<tr>
<td>Technology Bank for LDCs</td>
<td>leverage existing initiatives within the UN system and beyond to implement its programme of work and promote Science, Technology and Innovation (STI) in the LDCs.</td>
<td>6 Arab LDCs</td>
</tr>
<tr>
<td>GTTP</td>
<td>GTTP (Green Technology Package Program) was launched by JIPA to facilitate IP licensing. Emphasis is put on the “package” aspect as it includes consultancy, technical support and capacity building, as needed. Terms are agreed on a case-by-case basis. Some financial support might be available to help with license fees for those who cannot afford them.</td>
<td>All</td>
</tr>
<tr>
<td>WIPO GREEN</td>
<td>Resulted from an agreement between JIPA and WIPO. Described as a marketplace for sustainable technologies, it is an interactive marketplace that promotes innovation and diffusion of green technologies. It does this by connecting technology and service providers with those seeking innovative solutions</td>
<td>All</td>
</tr>
<tr>
<td>Development Banks</td>
<td>This is particularly the case for those dedicated to agriculture, such as AAAID, and The World Bank</td>
<td>Depends on their coverage</td>
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<td>UN Programs</td>
<td>The WFP, FAO &amp; IFAD is a great example of such opportunities</td>
<td>All that are eligible</td>
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<td>Agriculture R&amp;D Organisations</td>
<td>These are specialized in R&amp;D in the agricultural sector and develop technologies that can be of use, for example: ICARDA, AOAD (Arab Organization for Agricultural Development) and ICBA</td>
<td>Depends on their coverage</td>
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<tr>
<td>Country-Specific Support</td>
<td>SRTF (Syria Recovery Trust Fund). Created by many donors to help Syria recover. Offers funding as well as technical support and capacity building in specific sectors</td>
<td>Syria</td>
</tr>
<tr>
<td>International Development Agencies / Departments</td>
<td>These are individual countries own international development organizations, such as USAID (USA) and the United Kingdom’s Department for International Development (DFID)</td>
<td>Qualifying countries that need the support</td>
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<tr>
<td>CTCN</td>
<td>Climate Technology Centre and Network, promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries</td>
<td>All Arab countries</td>
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Technology Transfer Challenges

**Financial**: Many countries in the Arab region do not have financial resources to pay for the clean technologies. They need either full funding or access to finance with suitable terms.

**Legal**: Mainly the lack of a legal framework to protect IP in the case of patented technologies. This should be treated as a priority by all countries looking to tap into the latest innovations.

**Information and Application**: There is not enough awareness by many countries of available TT and capacity building opportunities, in addition to the poor quality of proposals submitted.

**Lack of skills and know-how**: In many Arab countries, the majority of people involved in agriculture are still using old methods that are, not only harmful to the health and environment but is also very inefficient and produces low yields. To increase skill and know-how levels, cooperation either South-South or North-South is required. This can be done via the large number of initiatives offered by the organizations mentioned in this report. One critical type of this cooperation should be that taking part within the Arab region itself.
Conclusions

Agriculture is a vital sector for most of the Arab countries, for different reasons.

The main technologies found across the region are use of solar energy, hydroponic/aquaponic farming as well as recycling and reuse of greywater.

There are very promising opportunities for the Private Sector to be involved in all Arab countries.

The gap between the Arab region and the developed countries in terms of availability of green technology for agriculture is not large.

Overall, lack of technology use is due to lack of funding and/or skills as well as lack of appropriate regulations to impose and/or incentivise the use of clean technologies.

Many Arab countries are in a conflict situation, which has devastated their agricultural sector and is hampering the efforts required to restore it and develop it sustainably.

The Arab region includes 6 countries classified as LDCs that require special assistance.

The limited intra-regional collaboration is a missed opportunity that could help all parties, for example, by creating an economy of scale and bringing costs down.

The opportunities for TT are numerous from various sources, and most of them available to the Arab countries in one form or another.

The challenges that could hamper TT are all solvable, there are no show stoppers, provided the will is there.
**Recommendations**

### Arab Countries
- Develop the right regulatory environment that incentivises the use of clean technologies in agriculture.
- Encourage the private sector through incentives, less red tape, finance access and Public-Private Partnership (PPP) opportunities.
- Encourage collaboration between Arab companies and governments to increase the scope for economic benefit and to lower the cost through economy of scale.

### Organizations (e.g. ESCWA, LAS, CTCN)
- Facilitate intra-regional networking and knowledge exchange via targeted events.
- Create and keep up-to-date a list of relevant technology transfer opportunities and providers and facilitate South-South and North-South collaborations.
- Compile and disseminate lessons learnt from across the region, especially in Arabic to maximize benefit coverage.
- Support learning and teaching of proposals writing.

### ETC
- Champion research into:
  - Combining the use of solar energy with hydroponics/aquaponics.
  - Cost effective grey water recycling and reuse.
  - Soil improvement technologies.