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Contribution by ESCWA

to the CSTD 2022-2023 priority theme on "Technology and innovation for cleaner and more productive and competitive production"

ESCWA's Contribution to the report on

Technology and innovation for cleaner and more productive and competitive production

1. What are some specific examples (from the public and private sectors) of green technology and innovation for cleaner and more productive and competitive production in your member countries? Please include contact, website, link to reports and any other relevant information concerning these projects and initiatives.

   The following are some examples of projects implemented in the Arab region on agricultural green technologies[1]:

   - **Examples from the region on green fertilizers:**
     - **"Compost Baladi"[2]** a Lebanese social enterprise that promotes the recycling of organic waste into compost. It provides waste management products and services such as designing and providing organic waste management equipment, providing technical consultancies and monitoring of composting sites, developing instructional manuals and guidelines on tailored composting solutions for households, local governmental entities, private establishments, academic institutions, providing awareness workshops targeting all ages and communities.
     - **"Douda Vermiculture Solution"[3]** an initiative established in Lebanon to promote the use of vermicompost in farming in the Middle East region to reduce the application of chemical fertilizers. It was tested in several villages in Lebanon and the practice was welcomed by the communities who showed interest in vermicomposting and willingness to continue using and expand its application at their household level.
     - **The Jordan Biochar Research Initiative (JBRI)[4]** initiated in Jordan in 2014 at Mutah University with a funding from "Support Research and Technological Development and Innovation initiatives and Strategies in Jordan" from the European Union (EU-SRTDII). The JBRI initiative aims at improving the knowledge on biochar and its uses in agriculture.

   - **Examples from the region on rainwater harvesting:**
     - **Rangeland rehabilitation in the Badia of Jordan using the Vallerani micro-catchment system[5]**, a project implemented by ICARDA to rehabilitate the Badia's rangelands which suffer from severe degradation due to increased grazing pressure and cultivation. Micro-catchment harvesting systems were used to capture the small amounts of precipitation to activate the rehabilitation of the rangeland. Following this intervention, biodiversity was increased, 40 to 50 % of the precipitation were prevented from being evaporated, the yield of the forage shrub (Atriplex) increased by 66%, the economic internal rate almost doubled in comparison to the traditional way of planting.

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[1] Examples were compiled by ESCWA as part of its work on agricultural green technologies under the project on "Enhancing resilience and sustainability of agriculture in the Arab region". Under this project, ESCWA developed knowlege material on five innovative green technologies in agriculture: Green Fertilizers, Rainwater Harvesting, Solar Dryers, Small-scale Food Processing, and Food bio-conservation. For more information about the project: https://bit.ly/3BnT21d

[2] https://www.compostbaladi.com

[3] https://www.doudavermiculture.com

[4] https://www.mutah.edu.jo/biochar-jo/index-2.aspx

[5] http://www.fao.org/teca/new-search-result/technology-detail/en/?uid=8757

- **Rooftop Water Harvesting for Greenhouse Production in Lebanon[6],** a project initiated by the Green Plan agency, an autonomous authority under the Lebanese Ministry of Agriculture to support farmers who produce flowers and vegetables in greenhouses in the Lebanese mountains. The project consisted of collecting rainwater from the rooftop of plastic greenhouses and storing it in ponds to be used in drip irrigating other greenhouses located below the pond.

2. What are the national strategies, policies, and laws concerning green technology and innovation for cleaner and more productive and competitive production in your member countries or region?

3. What are the key industries that are pioneering green innovation in your member countries or region? List the key actors in the national ecosystem of innovation related to green innovation in your member countries or region (firms, universities, financial institutions, regulators)? What are the key networks of the ecosystem in your region (including online networks, innovation hubs, forums, etc.)?

4. What are the challenges that governments in your region (or from your member countries) have faced or may face in promoting green technology and innovation in your country to contribute to national development priorities and accelerate the progress towards the SDGs?

   Main challenges facing governments in the Arab region in adopting agricultural green technologies were highlighted through a technology needs assessments conducted by ESCWA for the Ministries of Agriculture in Jordan, Lebanon and Palestine. This assessment aimed at assessing the level of knowledge and expertise of the ministries' staff in agricultural technologies and addressed the priority needs for each country on this subject based on environmental challenges they face, the level of awareness of farmers about these technologies, the scale of their application and the challenges hindering their adoption in each country. It was reported by the three countries that despite several attempts to promote agricultural green technologies, their application still remains at a small scale. Main reported challenges included the following:

   - Financial constraints and high cost of agricultural technologies
   - Complex design and operation of some of the technologies
   - Insufficient knowledge of the farmers and lack of capacity building on the subject.
   - Limited skills and expertise of farmers on operating and managing some of the technologies
   - Limited availability of some technologies at national level
   - Non-existing links between farmers and owners of these technologies
   - Cultural barrier and resistance of farmers to shifting to new technologies
   - Lack of legislations that compel farmers to adopt these technologies
   - Lack of applied trials/experiments of these technologies to serve as a successful model and reference to encourage the farmers to adopt them
   - Small size of farms and available areas for agriculture
   - Poor infrastructure in some agricultural areas
   - Security reasons especially in Palestine and restrictions imposed by occupation
   - Stagnating economic and institutional situation due to the COVID 19 pandemic.

5. What should governments, the private sector, organized civil society, and other stakeholders do so that developing countries can benefit from these technologies?

   a. Governments should put in place appropriate policies to promote the use of green technologies in agriculture such as policies related to enhancing education on the subject, encouraging investment in research, promoting strong public-private partnerships, incentive-based policies for farmers adopting green technologies…
   b. The private sector should invest in agricultural innovation R&D as it can lead to new technologies and production techniques that can boost agricultural productivity. The private

[6] https://www.unescwa.org/publications/climate-change-adaptation-agriculture-forestry-fisheries

sector can play an important role in importing needed equipment and infrastructure for adopting the green technologies.

c. Organized civil society can play an important role in transferring knowledge on green technologies through awareness raising and capacity development activities for famers and other stakeholders; in addition to implementing pilot projects that can be scaled-up by the governments. Civil society and organizations can also play the role of incubators or accelerators for young entrepreneurs interested in starting businesses in green agricultural technologies.

6. What are some examples of international cooperation mechanisms, projects, programmes or strategies, including triangular and South-South cooperation, in green technology and innovation that your organization contribute or is part of?

Under ESCWA's project on "Enhancing resilience and sustainability of agriculture in the Arab region[7]" the following relevant activities were implemented:

a. In partnership with the Arab Organization for Agricultural Development (AOAD), ESCWA organized in October and November 2021 five national consultation sessions on enhancing resilience and sustainability of the agriculture sector in Algeria[8], Egypt[9], Jordan[10], Lebanon[11] and Sudan[12]. These consultations aimed at identifying ways of enhancing the agricultural sector's resilience and sustainability at national level in the face of climate change, the unsustainable use of natural resources and the COVID-19 pandemic. On promoting the use of green technologies in agriculture, a working paper on "unlocking the potential of rainfed agriculture in the Arab region" through the adoption of agricultural technologies and practices such as rainwater harvesting among other practices was presented and discussed during these consultation sessions. Additionnally, national and regional success stories on enhancing the resilience and sustainability of the agricultural sector were shared, including ESCWA's work on developing the five technical booklets on agricultural green technologies and implementing capacity development activities related to promoting these technologies. Recommendations that resulted from these consultations focused on the environmental and socio-economic dimensions of enhancing agriculture resilience with a focus on the role of women and youth. National priorities and indicators towards enhancing the agricultural sector's resilience in the face of climate change and the unsustainable use of natural resources were also identified.

b. ESCWA organized a "buyers-sellers" meeting[13] following the training workshop on promoting agricultural green technologies which was implemented in the Bekaa region in Lebanon. This meeting targeted local agricultural cooperatives, mainly women, working in the agri-food sector. It aimed at putting them in contact with stakeholders who can help them directly or indirectly to successfully access the market, and to encourage them to adopt green technologies in their production. Following this meeting, cooperatives were inspired to use social media and more specifically WhatsApp to stay in contact, a handy and accessible application for all. Through their WhatsApp group, they were able to share news and information in a timely manner about latest expositions, local markets and possible support from donors or other entities.

7. What actions can the international community, including the CSTD, take to help developing countries take advantage of green technology and innovation for cleaner and more productive and competitive production?

[7] https://bit.ly/3BnT21d
[8] https://www.unescwa.org/events/enhancing-resilience-and-sustainability-algerias-agricultural-sector
[9] https://www.unescwa.org/events/enhancing-resilience-and-sustainability-egypts-agricultural-sector
[10] https://www.unescwa.org/events/enhancing-resilience-and-sustainability-jordans-agricultural-sector
[11] https://www.unescwa.org/events/enhancing-resilience-and-sustainability-lebanons-agricultural-sector
[12] https://www.unescwa.org/events/enhancing-resilience-and-sustainability-sudans-agricultural-sector
[13] https://www.unescwa.org/events/buyers-sellers-meeting-value-chain-development

Several actions can be undertaken by the international community to support the adoption of agricultural green technologies by developing countries, they include:

- Developing green agriculture financing mechanism that can boost the adoption of innovative green technologies and strengthen commercial investments
- Supporting technically and financially small and medium entreprises working in the agri-food sector
- Leveraging foreign direct investments which allow and facilitate technology transfer
- Investing in R&D related to agricultural green technologies to allow solid basis for selecting most appropriate technology for national or local context
- Supporting governments in policy reform to include green consideration in agriculture

8. Could you suggest some contact persons of the nodal agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further input or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

9. Do you have any documentation, references, technological assessments, future studies or reports on the priority theme in your country or region?

Under the project on "Enhancing resilience and sustainability of agriculture in the Arab region", ESCWA developed and published technical booklets and training manuals on green agricultural technologies that promote the adoption of these technologies and can help policy makers from the region to integrate their use in national development plans at regional, national and subnational levels. The technical booklets provide information related to the description of the green technologies, their design, and key advantages of adoption and challenges during implementation. And, the training manuals are intended for the use of trainers and extension officers, as they include detailed information and practical guidelines to assist them deliver effective trainings on the respective topics The links to these publications are as follows:

a. Links to technical booklets on green agricultural technologies:
    i. Technical booklet: rainwater harvesting. Available from: https://www.unescwa.org/publications/technical-booklet-rainwater-harvesting
    ii. Technical booklet: green fertilizers. Available from: https://www.unescwa.org/publications/technical-booklet-green-fertilizers
    iii. Technical Booklet: solar dryers. Available from: https://www.unescwa.org/publications/technical-booklet-solar-dryers
    iv. Technical booklet: small-scale food processing - fruits, vegetables and dairy products. Available from: https://www.unescwa.org/publications/technical-booklet-food-processing-fruits-vegetable-dairy-products
    v. Technical booklet: food bio-conservation. Available from: https://www.unescwa.org/publications/technical-booklet-food-bio-conservation

b. Links to training manuals on green agricultural technologies:
    i. Drying Fruits and Vegetables Using Solar Dryers: Training Manual. Available from: https://www.unescwa.org/publications/fruits-vegetables-solar-dryers
    ii. Micro-catchment rainwater harvesting: planning, design and implementation: Training manual. Available from: https://www.unescwa.org/publications/micro-catchment-rainwater-harvesting-training-manual