



Distr.
LIMITED
E/ESCWA/SDPD/2019/WG.37/L.1
27 August 2019
ORIGINAL: ENGLISH

Meeting Report

Economic and Social Commission for Western Asia (ESCWA), in cooperation with The Lebanese Ministry of Agriculture (MOA)

Technical meeting on “Context-based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon”

UN House, Beirut, Lebanon 26-27 August 2019

Summary

ESCWA and the Ministry of Agriculture (MOA) in Lebanon in cooperation with the Food and Agriculture Organization (FAO) of the United Nations, Lebanon Country Office organized a meeting in Beirut at the UN House during 26-27 August 2019 entitled “Context-based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon”. The aim of the meeting is to understand the status of technology transfer, adaptation, and use in agriculture in Lebanon including constraints for scaling-up and opportunities available to reach small farmers.

The meeting gathered 57 participants from Lebanon representing the Ministry of Agriculture, the Netherlands’ Embassy (main donor in agriculture), academia, research institutions, private sector, start-ups, farmers, independent technical experts, NGOs, and other UN organizations.

The meeting ended with key policy recommendations that ESCWA in cooperation with FAO and MOA will take into consideration to inform the forthcoming MOA’s strategy for 2020-2025 that is due on April 2020. The main message emphasized the importance of creating a platform to facilitate Public-Private-Academic-Partnership in technology transfer, adaptation, and use in the agriculture sector. Promoting ICT at the levels of farms and supporting agriculture functions, facilitating access to finance for climate smart agriculture technologies and start-ups, encouraging data sharing for informed decision, documenting successful initiatives to facilitate their scale-up, developing targeted capacity building programs, strengthening the institutional role of producers’ cooperatives in technology use and scale-up, and supporting collaboration of research, academia, and vocational schools in addition on curriculum development were highlighted as key policy priorities to endorse context-based technologies that enhance the efficiency and resilience of agri-food systems in Lebanon.

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I- Introduction

1. ESCWA and the Ministry of Agriculture (MOA) in Lebanon in cooperation with the Food and Agriculture Organization (FAO) of the United Nations, Lebanon Country Office organized a meeting in Beirut at the UN House during 26-27 August 2019 entitled “Context- Based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon”. The meeting responds to a technical advisory request that ESCWA received in April 2019 in order to support the MOA in specific themes that help in informing the new agriculture strategy that the Ministry is currently developing for 2020-2025
2. The meeting was attended by 57 participants from Lebanon representing MOA (the Minister office and several departments), the Netherlands’ Embassy (Ambassador office), research institutions (Lebanese Agriculture Research Institute (LARI), the National Council for Scientific Research (CNRS), ICARDA), academia (faculties of agriculture from Lebanese University, American University of Beirut, and Saint-Joseph University), private sector (Robinson Agri, Debbaneh, and Hydroponica), start-ups and clusters (Agrytech, IOTree, LifeLab, Rigino, QOOT), NGO and UN organizations (UNDP, FAO, Lebanese Reforestation Initiative, Polish Center for International Aid, George Frem Foundation), the Chamber of Commerce, Industry, and Agriculture, in addition to farmers and independent agriculture experts.
3. The meeting succeeded in bringing together main stakeholders to discuss challenges and opportunities for technology transfer, adaptation, use, and scale-up in the agriculture sector in Lebanon. It represented an inclusive process of policy development that is strategic in a cross cutting theme like context-based technologies under a liberal political economy where the private sector leads main initiatives and requires a supporting enabling environment from the state to ensure scaling-up. The main message emphasized the importance of creating a platform to facilitate sectoral Public-Private-Academic-Partnership in technology transfer, adaptation, and use. Promoting ICT at the levels of farms and supporting agriculture functions, facilitating access to finance for climate smart agriculture technologies and start-ups, encouraging data sharing for informed decision, documenting successful initiatives to facilitate their scale-up, developing targeted capacity building programs, strengthening the institutional role of producers’ cooperatives in technology use and scale-up, and supporting collaboration of research, academia, and vocational schools were highlighted as key policy priorities to endorse context-based technologies that enhance the efficiency and resilience of agri-food systems in Lebanon.

II- Recommendations

4. The meeting concluded a set of recommendations and key messages which will assist the Ministry of Agriculture in developing a context-specific strategy for 2020-2025 to facilitate the transfer, adaptation, use, and scale-up of context-based technologies in the sector in collaboration with main stakeholders. Key messages are summarized as follows:
 - Improve relevant data sharing to facilitate transfer and use: data that assess efficiency and resilience or help in the decision-making processes should be better documented and disseminated. Research organizations are encouraged to improve the monitoring and evaluation of their piloting and undertake scaling-up from a cost-benefit analysis to prepare

the ground for the private sector. Successful initiatives should be transferred to farmers and on-the job training to extension agents should be provided

- To understand better the market dynamics of technology use in agriculture it is highly recommended to conduct an agriculture technology readiness assessment. The latter will inform structured programming to help overcome bottlenecks for technology transfer and use
- Design a targeted approach to technology in agriculture by differentiating between old technologies that are available in the market and mainly require access to finance to use them and new technologies that still need various programming directions to transfer, understand the importance, and facilitate adaptation and use
- Consider strengthening ICT in the supporting functions of the sector (extension, research, access to finance, cooperatives, legal registration, etc.) to facilitate services and farmers' outreach
- Focus on capacity building of extension agents and graduates of vocational schools to help transfer context-based technologies to achieve intended objectives that should measure the improved efficiency and resilience of agri-food systems
- Make sure technical curriculums in graduate and vocational schools include the concept of technology adaptation and use as a cross-cutting theme
- Support access to markets to facilitate technology use. Good markets will improve farmers' income and encourage them eventually to access available technologies. This will give them an incentive and positive return on investment that is difficult to be achieved unless wholesale markets are better managed through ICT use and other quality factors
- Support the initiation of a Public-Private-Academia-Partnership platform that is mandated to facilitate data sharing and coordination to help technology transfer, adaptation, and scale-up in the sector
- Facilitate access to finance by supporting climate smart agriculture technology products with the banking sector. Producers requesting loans to use technologies should be subsidized by low-interest rate programs that monitor the impacts on efficiency and resilience
- Develop a special tax exemption program that selects successful piloted agriculture technologies to facilitate their adoption by farmers. This can reduce the start-up cost that is a big challenge for small producers
- Design different technology use and scale-up programs for small and big producers. This will help the private sector to understand the market and develop structured interventions to reach out most producers
- Empower cooperatives to play an effective role in the dissemination and adoption of context-based technologies. This necessitates a review of the cooperative sector to improve its credibility and ability to deliver services to members
- Technology should be supported across value chains from the production to the market. This will help in classifying technologies that require individual investment at farm level compared to technologies that require collective investment at market level and other supporting functions
- Design demonstration plots that group multiple actors (research, extension, academia, private sector, farmers, etc.) to help in analysis, dissemination, and scaling-up
- Support value chain clusters that are capable of grouping efforts of value chain actors to facilitate technology transfer, adaptation, and scale-up

III- Summary of discussions

A- Opening Session

5. Ms. Reem Najdawi, Chief of Food and Environment Policy Section (FEPS), facilitated the opening session and started by welcoming the Minister of Agriculture H.E. Dr. Hassan Lakkis, the kingdom of the Netherlands' Ambassador to Lebanon Mr. Jan Waltmans, and Mr. Maurice Saade, FAO Lebanon Country Director and the participants.
6. Mr. Juraj Riecan, Director of Statistics Division, gave ESCWA welcoming statement on behalf of the Executive Secretary. He explained the aim of the meeting and thanked all stakeholders for their participation. He emphasized on the importance of the agriculture sector in Lebanon that goes beyond the 3% contribution to GDP. He mentioned that agriculture is the economic vein of rural remote areas and generates the highest rural employment in addition to good quality food that is affordable by the local population. Its significant role in trade (22% of total exports and 18% of total imports in 2018) connects the country with the Arab Region and the world. It opens business opportunities in competitive and differentiated markets. However, the sector is challenged by structural barriers. Land degradation and desertification, land fragmentation, increased frequency and intensity of climate variations and extremes, and water scarcity are threatening agri-food systems in Lebanon. He pointed out that technology transfer, adaptation, and scaling up remain a challenge for the developing world including Lebanon. Efforts to facilitate knowledge transfer in technology are extremely important to build the human capital and encourage the private sector to lead the process. Integrated approaches are required to create a suitable enabling environment to address context based priorities and design targeted strategies.
7. Dr. Maurice Saade, FAO Lebanon Country Director, highlighted the importance of facilitating technology transfer and use to reach small farmers. He noted that FAO Lebanon is working with the Ministry of Agriculture to build the capacity of extension agents to leverage context based technologies and transfer it to farmers. He thanked ESCWA for convening the meeting that will help to inform the new strategy that FAO is working to develop it with the Ministry of Agriculture.
8. Mr. Jan Waltmans, Netherlands Ambassador to Lebanon, valued the timing of the meeting and the diversity of participation. He indicated that the vast experience gained in the Netherlands in agriculture technologies is being made available to partners in other countries. Lebanon is now able to export potatoes for the first time in many years. Knowledge and support from the Netherlands to Lebanese partners has been instrumental in this. High quality vegetable seeds are being made available to Lebanon and farmers are being trained in order to ensure that through right treatment of the seeds and soil high yields can be assured. He added that the agri-food system in Lebanon can be strengthened. It requires sound government policies and their swift implementation, transparent and adequate procedures and strong cooperation between universities, the private sector, government agencies and their UN, NGO and other partners. He ended by ensuring that The Netherlands will remain a partner in this process.
9. H.E. Dr. Hasan Lakkis, Minister of Agriculture in Lebanon, welcomed all stakeholders and thanked ESCWA for organizing the meeting. He highlighted the importance of technology use in the sector to decrease the cost of production and increased producers' income. He encouraged participants to share

experience and knowledge to inform the forthcoming agriculture strategy for 2020-2025. The Minister stated the importance of activating agriculture cooperatives to facilitate technology transfer and use through better access to finance and markets. He ended by giving examples of technology support through the ministry's programs and encouraged donors to prioritize the development of agriculture technology sector in their agendas.

Day 1:

B- Session 1: The role of the Lebanese Ministry of Agriculture in developing agriculture technologies and promoting an enabling environment for adoption and scaling-up

10. Ms. **Wafaa Dikah Hamze**, chaired the session and introduced the speakers. Then, she facilitated the discussions and questions from participants
11. The first presentation was delivered by **Ms. Lamyia Al Tawm**, head of programs and project department in the MOA, Lebanon, about the programs and projects implemented within the framework of the Ministry of Agriculture' strategy. She highlighted the major challenges facing the agricultural sector in Lebanon including the decline in its contribution to the national economy. She listed the programs and projects implemented by MOA within the framework of the last strategy (2015-2019). Ms. Tawm focused on 8 initiatives as part of the strategy including projects to increase the productivity and competitiveness of the Lebanese products; and, emphasized on projects intended to improve the quality and safety of food locally produced and imported. The second presentation was given by **Mr. Maurice Saade**, FAO country director, he highlighted the role of Farming Business Schools (FBS) in helping farmers acquiring knowledge and skills to make their farms more profitable. He also mentioned the possible role of FBS in exchanging technical knowledge between farmers and promoting context-based agriculture technologies. The third presentation was delivered by **Ms. Maya Mhanna**, head of irrigation and rural department in the Ministry of Agriculture of Lebanon and covered a first case study regarding MOA's experience and challenges in the use of water and irrigation management models to promote productivity of major crops in Lebanon as well as some results. She started with an overview of the irrigation sector in Lebanon and the major challenges facing it including changes in climatic conditions mainly reflected through an increase in drought seasons. Ms. Mhanna then discussed the role that technologies can play in agriculture and irrigation management such as remote sensing and simulation modelling. She gave the example of Aquacrop, a crop water productivity model developed by FAO and transferred by the MOA through a capacity building program implemented by ESCWA; and shared with us the benefits and challenges of this model. Finally, she concluded by emphasizing on the importance of creating a systemic information sharing system between different concerned parties.
12. Then, Ms. Wafaa Dikah Hamze opened the floor for the general discussion. Participants and speakers raised the following issues:
 - Concerns were raised about the decrease of the agriculture sector's contribution to the Lebanese GDP over the past 10 years. The Ministry of Agriculture responded that the sector's contribution to the Lebanese Economy has significantly decreased over the past years where it contributed to 6 -7 % of the GDP and now it has decreased to reach around 3%. This is due to structural problems and also due to the effect of the Syrian crisis
 - Participants highlighted that smuggling of goods is among one of the main obstacles facing agriculture. In fact, uncontrolled trade and weak application of the agriculture trade calendar

- are allowing products, which are locally produced in Lebanon at the same time, to enter the market and compete with local production. Those will be sold at a much cheaper price and sometimes possess a better quality than national products due to specific agricultural subsidies policies. Lebanon is trying to boost the agriculture sector in many ways. However, if the market is saturated with foreign products, good results are difficult to be achieved
- A farmer from Beqaa suggested that regulating the trade of agricultural products should be on top of policy recommendations for the forthcoming agriculture strategy
 - FAO was encouraged to strengthen its partnership with the private sector to facilitate information sharing between different stakeholders
 - Access to subsidized agriculture credits is crucial to stimulate agricultural growth and convince farmers to adopt new technologies, especially those related to irrigation techniques
 - Participants delivered some comments on the importance of directing public efforts towards rain fed crops instead of irrigated crops in light of increasing pressure of climate change and water scarcity
 - The session ended by concluding that managing this sector requires a multidimensional and multifaceted approach, as agriculture is a cross cutting issue. The government must prioritize the development of the agriculture sector to boost economic growth in rural areas and eventually at national level

C- Session 2: The role of applied research institutions in the transfer, adaptation and adoption of agricultural technologies in Lebanon

13. **Mr. Michel Afram**, chaired the session and introduced the speakers. Then, he facilitated the discussions and questions from participants
14. **Mr. Talal Darwich**, a project manager in the National Council for Scientific Research (CNRS), Lebanon presented with an overview of CNRS in the transfer, adaptation and adoption of agricultural technologies- challenges and opportunities. He addressed key areas of technology development including geographic information systems, spatial modelling, production efficiency under extreme weather conditions, etc. Mr. Darwich focused on the challenges accompanied with agriculture technology adoption like insufficient funds and urban sprawl taking place on field crops. An overview of the strategy and vision of the Lebanese Agriculture Research Institute (LARI) in the transfer, adaptation and adoption of agricultural technologies-challenges and opportunities followed, and was presented by **Mr. Michel Afram**, the director general of LARI, Lebanon. He listed LARI's scope of work as part of its 2018-2025 policy. To name a few, this scope includes water management, climate change, protection of natural resources, the expansion of seed bank and most importantly the use of technology for early insects, diseases and weather conditions' warnings; and also for irrigation management. Afterwards, the country director of ICARDA, **Mr Hassan Machlab** introduced a new strategic approach for delivering innovative science based-solutions for thriving and resilient dry lands. He talked about the importance of dry lands which cover 41% of the world land surface and suffer from land loss due to desertification. Then, he listed ICARDA's research agenda's priorities such as conserving agricultural biodiversity, breeding for climate-adapted crops and livestock, etc. Mr. Machlab then presented four cross cutting-themes that ICARDA relies on to pursue its research agenda and these include scaling up proven technologies, building capacity, empowering women and youth and enhancing information exchange. He concluded with some success stories like the climate resilient early maturing lentil in South Asia.
- The second case study revolved around the findings and recommendations for large and small farmers regarding the application of water saving techniques, and was presented by **Mr. Ihab Jomaa**, the head

of irrigation department at LARI. The importance of technology in irrigation management was highlighted in his presentation. He provided the participants with some technologies used to increase irrigation efficiency. For example, ‘Tensiometer’ as a low tech is vital for irrigation timing and ‘Water-pressure gauge in pipes’ are needed to ensure water access to the network. This is widely available in the market but rarely used by farmers. The third case study entitled “the barley sprout production to reduce the cost of livestock feeding and pressure on rangelands” was presented by **Mr. Joseph Kahwaji** the head of forages department at LARI. He presented the advantages of this technique, in particular high-water use efficiency for a high nutritive value forage. He then raised the challenges and barriers for scaling-up including the high cost of adoption by small farmers, the lack of awareness on modern feeding practices, and the feasibility of production that was not yet ready at this phase.

15. Then, Mr. Michel Afram opened the floor for the general discussion. Participants and speakers raised the following issues:

- Concerns were addressed to LARI and ICARDA regarding agriculture technologies transfer to end users (farmers). The possibility of adding new services within LARI portfolio to cover crop water management and land capacity evaluation was proposed.
- A comment was given on the evapotranspiration measurement method; more specifically in the Bekaa area, as the increase in hot winds and moisture would dry up the first few centimeters of soil; distorting the results. Hence, synchronization in measurements is needed.
- CNRS clarified that the land use maps are updated once every five years, but their main concern is getting clear and detailed satellite images; which costs a lot. Reference to CNRS webpage was provided to access specific remote sensing data
- Access to data and data sharing are main barriers for modeling water management at farm level. Participants stressed the point that cooperation between different stakeholders should be strengthened to avoid overlapping and duplication of data measurement
- Session 2 was concluded by stressing on the importance of developing and expanding new technologies in accordance with the new research outcomes and suggestions. Farmers find it difficult to take advantage of the availability of the new findings; their access to production and market-related information should be enhanced and facilitated. Science, research and new findings should be incorporated into machinery and equipment to be used in agricultural production systems. Finally, feasibility studies should be carried out in order to justify and convince the farmer to adopt those new technologies as well as for the private sector to scale-up their use

D- Session 3: The role of the agriculture faculties in directing their research and programs to promote technology development in the agriculture sector

16. **Mr. Elias Ghadban**, chaired the session and introduced the speakers. Then, he facilitated the discussions and questions from participants

17. During this session, The American University of Beirut (AUB), represented by Deputy Dean Mr. Ammar Olabi, The Lebanese University (LU), represented by Dean Mr. Samir Medawar, and Saint-Joseph Univeristy, represented by the Director of Research Ms. Yolla Ghora Chamoun detailed their strategies to include and encourage agriculture technologies in their curriculum, and the results achieved. **Mr. Olabi** started his presentation with FAFS 2025 strategic goals. He focused on integrating research and technology in supporting the Water-Energy-Food-Health Sciences in Lebanon and MENA region. He also talked about a project proposed by AUB professors on Google’s AI in improving water irrigation management. The second presentation was provided by **Mr. Medawar**, who shared the latest research done at the LU

regarding technology adaptation in agriculture (hydroponic and soilless) and livestock production mainly poultry. He explained their role in outreach to farmers close their university' demonstration plots. The final presentation of this session was delivered by **Ms. Ghorra** on the development of food value chains in the Bekaa (mainly) through education and technology transfer. She highlighted the role of the university' labs in food, soil, and water and fruit analysis using different technologies. She gave concrete examples of the support provided to the private sector (Kefraya, Masterships, etc.) through better technology use to decrease the cost of production and improve the efficiency of water use.

18. Then, Mr. Elias Ghadban opened the floor for the general discussion. Participants and speakers raised the following issues:

- Modernizing farming practices should rely on data and information sharing to facilitate the transfer and adaptation of new practices/technologies
- Disseminating information from academic/research institutions to reach farmers and agri-food processing companies should focus on decreasing the production cost and environmental impacts. An efficient mechanism for scaling-up the dissemination through ICT should be encouraged
- Knowledge transfer on technology use between experts, farmers, and students should be encouraged across value chains
- The role of universities is to engage students and encourage their participation in agricultural-related activities and lift the already existing negative perception associated with this sector.
- Financial resources are needed to support universities in integrating context-based agriculture technologies into their curriculum and facilitate its transfer to their research institutions and to farmers
- Cooperation between universities is essential to reduce the cost of technology transfer and adaptation
- Universities are encouraged to reach-out to farmers to help designing applied research answering field challenges
- Technical incubators for technology transfer and adaptation are well positioned to help in facilitating learning and knowledge sharing in the sector

E- Session 4: General discussion to draw lessons learned from morning sessions and propose policy recommendations tailored to design the principles of agricultural technology development within the strategy of the Ministry of Agriculture for 2020-2025

19. **Ms. Wafa Dikah Hamze, Mr. Fouad Mrad and Mr. Elias Ghadban** opened the floor for the general discussion of the last session of day 1.

20. Participants and speakers raised the following issues:

- A multidisciplinary approach should be adopted to facilitate technology transfer, adaptation and use in Lebanon. Efforts are still scattered and there is a need to group them through a structured approach that highlights priorities and work to implement them
- Discussions were centered around the selection of strategic crops that stakeholders should focus on in prioritizing technology transfer, adaptation, and use. This should be a priority to be identified in the forthcoming strategy
- Farmers should be given various incentives to invest in technology that is directly related to efficiency and resilience. Farmers' group should be empowered to facilitate technology use at individual member level and at group level through services and product supply (economy of scale)
- MOA should consider introducing ICT in processes and supporting functions (extension, cooperatives, etc.) to facilitate access of farmers to information and reduce bureaucratic barriers
- Sustainable practices (integrated use of natural resources) of natural resources should be promoted by all stakeholders through the use of context-specific technologies
- In addition to agriculture experts, technology experts should be brought on board when designing sector specific technology transfer policies

Day 2:

F- Session 5: Adoption of agricultural technologies by small and large farmers – Challenges and adaptation mechanisms

21. **Mr. Hussein Nasrallah**, chaired the session and introduced the speakers. Then, he facilitated the discussions and questions from participants.

22. **Mr. Ahmad Osman Khodr**, a farmer from Bekaa gave the first presentation on growing, washing and packaging carrots: energy and water management and proper soil use. He talked about harvesting rain water for irrigation; and the use of machines and technology to wash, pack carrots, and regulate water use. He was able to reduce water use by 60% due to technology use. Also, he mentioned that they installed solar energy units to operate the processing factory through alternative energy. This contributed to a significant decrease in the cost of production. The second presentation explained how to grow soilless vegetables (lettuce, tomatoes, eggplants) under greenhouses in Jounieh, by **Mr. Nagi Qamar**; a farmer from Mount Lebanon. He presented the advantages of soilless agriculture such as relying on less water and pests' usage, avoiding soil-borne diseases and resulting in higher yields. Yet, the adoption of this agriculture technology is expensive and requires fulltime electricity as well as high technical knowledge. Soilless farming, hydroponics and other agriculture technologies are needed to improve the agriculture sector in Lebanon. Afterwards, **Mr. Bashar Berro**, an agricultural consultant in Lebanon, provided the audience with some facts/challenges about the Lebanese farming system including small scale farms, lack of extension services, seasonal charts and support for national crops. He also mentioned that small scale farmers need basic easy to use and affordable technology that will help them increase the efficiency of their farming practices and thus make a change. Finally, **Mr. Ahmad Zeiter**, an agricultural engineer from Bekaa, ended the session by presenting a hydroponic floating system to grow vegetables in the Bekaa valley that had to be stopped

in July 2019 due to market challenges. He achieved a higher efficiency in water and nutrient use but the market structure prohibited him from generating the return on investment in the technology.

23. Then, Mr. Hussein Nasrallah opened the floor for the general discussion. Participants and speakers raised the following issues:

- Farmers stressed the point on market competition from imported production that enters local wholesale markets through smuggling. This is decreasing the profitability of production and so the ability of farmers to pay for new technologies or maintain the use of new technologies
- Agriculture credits programs in Lebanon are not well structured to facilitate agriculture investment including new technologies. Interest rates are high compared to the revenues generated from agriculture considering the dysfunctionality of markets due to smuggling and the effect of the Syrian crisis
- Only few farmers are benefiting from knowledge transfer in technology in general, which limits the overall development and farmer inclusion in the agri-food sector. The importance of farmer's trainings was highlighted.
- Farmers will be encouraged to adopt new technologies if stakeholders provide them with feasibility studies showing the positive financial return on investment. This is the key to accelerate adoption and not only environmental benefits
- Piloting and learning by doing is essential to convince farmers. They need to see impacts before they adopt. This could be facilitated by research and academic institutions. This should be a priority in the new strategy

G- Session 6: Private sector's transfer and adoption of agricultural technologies – success stories and Challenges

24. **Mr. Ibrahim Hawi**, chaired the session and introduced the speakers. Then, he facilitated the discussions and questions from participants.

25. **Ms. Nadine El Khoury**, the chief operating officer of Robinson Agri, listed technologies supplied by the company and had proved their impacts on natural resource conservation including hybrid seeds, grafting and smart irrigation. However, as previously mentioned above, many challenges limit the agriculture technologies transfer and adaptation in particular access to finance and market challenges. Then, **Mr. Ziad Ghanem**, who is the central technical and development Manager of Debbane Agriculture Holding, emphasized on the agricultural technologies capable of supporting grape production in Northeast Baalbeck. He highlighted that the young generation does not have interest in this sector due to low profitability. Water scarcity is still a major driving force to the search and adoption of agriculture technologies. He tackled the issue of saturation of local market; therefore, there is a need to find new markets to export our produce, and thus the Government is called to strengthen IDAL & subsidize export. The technologies introduced by Debbane succeeded in improving productivity and resilience. Their use is challenged by lack of access to finance and market. The company tried to work on access to markets and have penetrated competitive markets in European countries by introducing on time appropriate high yielding varieties. Finally, the ability to increase productivity through hydroponic farming and the challenges of transfer and adoption, were displayed by **Mr. Mazen Mneimneh**, the general manager of Hydroponica in Lebanon. He talked

about the high efficiency of production (water and nutrient) but low scale-up potential due to high cost and low competitive markets. He implemented 15 projects across 3 years.

26. Then, Mr. Ibrahim Hawi opened the floor for the general discussion. Participants and speakers raised the following issues:

- Scaling up technology use requires stakeholders' efforts to improve access to finance and control market disorders. The government should intervene in framing wholesale market management with concerned authorities to improve trusts in local markets and avoid unbalanced competition through illegal trade
- Private sector should be supported to facilitate technology transfer, use, and scale-up. Regional forums, legal framework, tax exemption are few examples. Joint committees between private-public and academia should represent the base to remove barriers and work on opportunities
- Introducing technologies like hydroponic production needs joint capacity building and market differentiation programs to certify production and increase its return value

H- Session 7: The role of stakeholders' clusters in agriculture and start-up companies in the creation and support of context-based agriculture technologies

27. **Ms. Hala Abdallah**, chaired the session and introduced the speakers. Then, she facilitated the discussions and questions from participants.

28. Berytech case study was presented by **Mr. Ramy Bou Jawdeh**, the deputy general manager of Agrytech, who shared the experience of a cluster initiation for start-ups in agriculture technologies in Lebanon. He detailed the process of start-ups' support and achievements over the last 3 years. He described how private sector companies and new start-ups ideas tried to respond to farmers' challenges and presented scalable solutions. His presentation was followed by **Ms. Jihane Chahla**, the cluster manager at Agrytech, who delivered a presentation on the Lebanese agricultural food innovation and some sustainability challenges. She highlighted the interactions between different start-ups and the coaching journey that help participants to innovate context-specific solutions in agriculture. The, three Start-up companies introduced their work including: **Ms. Sabah Corm**, the co-founder of RiginO, a traceability platform aiming to increase consumers' trust and brand perception; also, it helps improving producers' market access and business growth. The second start-up, was presented by **Ms. Nisrine El Turkey**, the founder of IOTree, which is an app that inform farmers about the intensity of insects attack the right timing to control them. This will eventually reduce crop damage and loss, increase quality and reduce the cost of management. She is still testing few prototypes before putting the product in the market. The third start-up was delivered by **Mr. Ali Makhzoum**, Lifelab co-founder, and was about IoT-Connected CEVA (Controlled-Environment Vertical Agriculture) which helps in harnessing scalable cutting-edge technology to transition Lebanese agro-production into the 21st century. All start-ups had in common the same challenges in particular lack of financial support (initiation phase) and poor market access to promote their agricultural innovations. They emphasized the need of technology adoption across supply chain stages.

29. Then, Ms. Hala Abdallah opened the floor for the general discussion. Participants and speakers raised the following issues:

- The weak food marketing strategy is hindering agricultural revenues and progress. This requires a multi-sectoral approach and mostly the support of the MOA by other ministries (Economy and trade)
- Another problem is that, when promoting the use of such new technologies, marketing techniques are focusing mostly on the sustainability aspect that not all consumers are aware of or understand; yet, they are more inclined and attracted to the improved quality, shape and taste (organoleptic properties) of products deriving from innovative production technologies.
- Marketing techniques lack monetary incentives; the farmer or producer needs to see the economic benefits and profitability. Lebanese producers and marketers should cease the exceptional chance of having region specific food products that are attractive to sophisticated consumers, and could have a higher chance of being exported due to their rare presence in the global market.
- It was also highlighted that the new generation is a better target for technology transfer and usage, as showing young people new, innovative, easier and more effective ways of farming would attract and encourage them back into the sector.
- Moving start-up products to the testing and scaling-up level requires market assessment and access to credits

I- Session 8: The role of non-governmental organizations and development agencies in agriculture technology's adoption and transfer

30. **Ms. Amal Salibi**, chaired the session and introduced the speakers. Then, she facilitated the discussions and questions from participants.

31. **Mr. Dominique Choueiter**, project officer at the UNDP, presented innovative solutions in rangeland management and shared with us a practical experience from the Qaraoun Catchment. He highlighted how GIS modeling facilitated the design of management plan aiming to reduce the pressure on natural resources. This was followed by a case study from the Polish Center for International Aid, given by its program officer **Mr. Andre Abou Haidar**, who talked about the Food For Training (FFT) programme implemented recently by PCPM which provided farmers with in kind assistance like using irrigation water efficiently, improving harvest techniques of olives, improving chemical application and coverage. This was followed by another case study from Lebanon Reforestation Initiative (LRI). **Mr. Joseph Bechara**, GIS expert, who explained the objectives of this NGO in improving the management and conservation of forests across Lebanon. He also mentioned the role of technology in facilitating their goals. Finally, **Mr. Said Gedoun**, the deputy general manager of the Chamber of Commerce Industry and Agriculture in Zahle, talked about Agvisor application, an agriculture mobile application that enables the users to get acquainted with and compare the latest prices of vegetables and fruits in the local wholesale markets; it also allows the users to improve their product quality by accessing the latest agricultural practices and studies through the agriculture library and by communicating with specialized agricultural engineers.

32. Then, Ms. Amal Salibi opened the floor for the general discussion. Participants and speakers raised the following issues:

- Participants encouraged the use of application like Agvisor for specific production systems like organic farming
- Using GPS and other systems to identify hot spot degradation in rangelands or potential forest fire proved to be very efficiency in guiding sound managed
- Success stories in using technology in reforestation initiatives should be disseminated with other partners working under the government umbrella to plant the 40 million trees initiatives

- Applications like Agvisor should also try to cover the livestock sector that is significant in the Bekaa and the North
- Concerns were raised regarding the taste and nutritional content of products resulting from hydroponic farming
- The application of agricultural calendar and control of agricultural trade were also pointed out in this section as a top priority

IV. Organization of work

A- VENUE AND DATE

33. The Technical Meeting on context-based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon was held on 26-27 August 2019 at the UN-House, Beirut, Lebanon.

B- OPENING

34. The Technical Meeting was formally opened on Monday 26 August 2019, at 09:30 a.m. with remarks from Ms. Reem Nejdawi, Minister of Agriculture in Lebanon H.E. Dr. Hassan Lakiss, Netherlands' Ambassador H.E. Mr. Jan Waltmans, and Mr. Juraj Riecan.

C- PARTICIPANTS

35. The meeting was attended by 57 participants from Lebanon and 6 members from ESCWA.

36. The list of participants to the Technical Meeting is attached as Annex I.

D- AGENDA

37. Remarks, presentations and discussions were made and held over the following sessions:

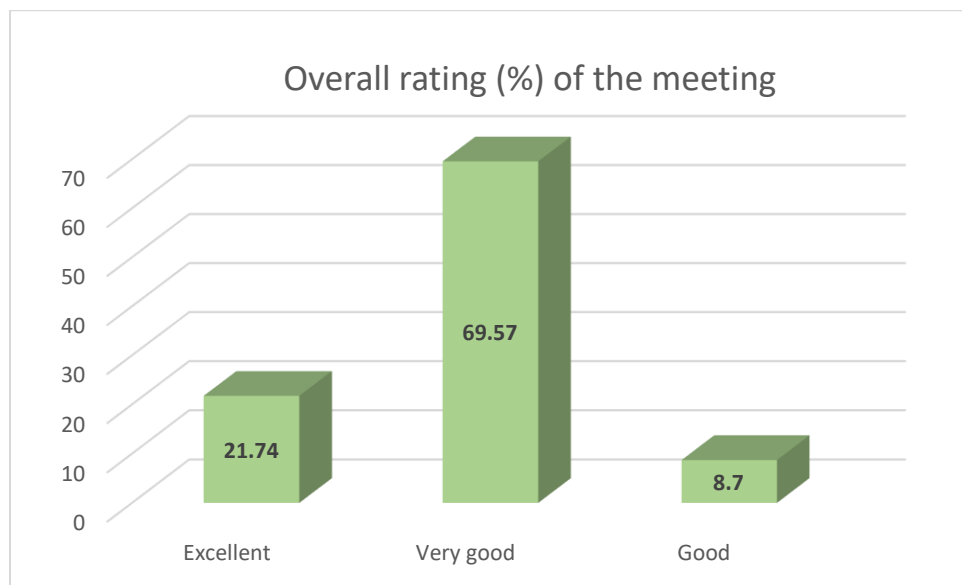
- Opening Session,
- Session 1: The role of the Lebanese Ministry of Agriculture in developing agriculture technologies and promoting an enabling environment for adoption and scaling-up,
- Session 2: The role of applied research institutions in the transfer, adaptation and adoption of agricultural technologies in Lebanon
- Session 3: The role of the agriculture faculties in directing their research and programs to promote technology development in the agriculture sector
- Session 4: General discussion to draw lessons learned from morning sessions and propose policy recommendations tailored to design the principles of agricultural technology development within the strategy of the Ministry of Agriculture for 2020-2025
- Session 5: Adoption of agricultural technologies by small and large farmers – Challenges and adaptation mechanisms

- Session 6: Private sector’s transfer and adoption of agricultural technologies – success stories and Challenges
- Session 7: The role of stakeholders’ clusters in agriculture and start-up companies in the creation and support of context-based agriculture technologies
- Session 8: The role of non-governmental organizations and development agencies in agriculture technology’s adoption and transfer
- Policy recommendations and closing remarks.

38. The agenda of the Technical Meeting is attached as Annex II.

E- EVALUATION

An evaluation sheet was distributed to participants at the end of the meeting to assess quality and impacts. As shown in the chart below, 91% of the participants responded that the overall rating of the meeting was excellent and very good.



Eighty-seven percent of participants agreed that the meeting’s objectives were clear. In total, 67% of participants stated that the content of presentations was very good and excellent. As for the rest of evaluation questions, the following percentages were received for excellent and very good answers:

- Relevance to participants’ field of work: 87.5%
- Participatory discussion: 79%
- Coordination and effectiveness: 65%
- Exchange of info between participants: 92%
- Organizational arrangement before and during the meeting: 87.5%

Among the recommendations, it was suggested to allocate more time for discussions, increase farmers' engagement to give more realistic insights, organize another meeting to follow up on the implementation of policy recommendations. Some participants suggested the Ministry of Economy and Trade and the banking sector, donor organizations like USAID should have been invited. Moreover, donor organizations should dedicate a part of their funding's and invest in the agriculture technology sector in Lebanon. One participant suggested that it would have been interesting if there was a session on the role of technology in food industry. One common comment was that the initiative of bringing together all stakeholders, academia and farmers on one table was amazing, and a good start for improving the agriculture technology sector in Lebanon.

F- DOCUMENTATION

39. The meeting details, presentations and selected pictures are provided at the following link:
<https://www.unescwa.org/events/technologies-efficiency-resilience-agrifood-systems-lebanon>

Annex I: LIST OF PARTICIPANTS

E



Distribution. Limited
28 August 2019
ORIGINAL: ENGLISH
E/ESCWA/SDPD/2019/WG.37/L.2

Economic and Social Commission for Western Asia (ESCWA)

Technical Meeting on “Context-based Technologies to Enhance Agriculture Efficiency and Resilience in Lebanon”
UN House, Beirut, Lebanon, 26 - 27 August 2019

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Annex II: AGENDA OF THE MEETING

UNITED NATIONS

E



Distr.
LIMITED
E/ESCWA/SDPD/2019/WG.37/L.1
27 August 2019
ORIGINAL: ENGLISH

Economic and Social Commission for Western Asia (ESCWA)

The Lebanese Ministry of Agriculture (MOA)

Technical meeting on “Context-based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon”
Beirut, Lebanon 26-27 August 2019

Agenda

Day 1: Monday 26 August 2019

- 09:00-9:30 **Registration**
- 09:30-10:00 **Opening session**
Moderator: Ms. Reem Nejdawi – Chief of the Food and Environment Policies Section – ESCWA
- **Welcoming statements**
 - **Economic and Social Commission for Western Asia (ESCWA)**
Mr. Juraj Riecan – Director of Statistics Division
 - **United Nations Food and Agriculture Organization (UNFAO)**
Mr. Maurice Saade – Country Director – Lebanon
 - **Embassy of the Kingdom of the Netherlands**
H.E. Mr. Jan Waltmans – Ambassador of the Netherlands in Lebanon
 - **Lebanese Ministry of Agriculture**
H.E. Dr. Hasan Lakkis – Minister of Agriculture – Lebanon

19-00941

10:00-10:30	Coffee Break
10:30-12:00	<p><u>Session I: The role of the Lebanese Ministry of Agriculture in developing agriculture technologies and promoting an enabling environment for adoption and scaling-up</u></p> <p>Moderator: Ms. Wafaa Dikah Hamze – Former Minister – Ministry of Agriculture – Lebanon</p> <ul style="list-style-type: none"> • Programs and projects implemented in the framework of the Ministry of Agriculture strategy Ms. Lamya Al Tawm – Head of Programs and Development Projects Service – Ministry of Agriculture – Lebanon • Farm Business School (FBS): An innovative approach in agriculture extension Mr. Maurice Saade – Country Director – FAO – Lebanon • Case study 1: Use of water and irrigation management models to promote productivity of major crops in Lebanon- MOA experience, results and challenges Ms. Maya Mhanna – Head of Rural Engineering Services – Ministry of Agriculture – Lebanon • Q&A
12:00-13:30	<p><u>Session 2: The role of applied research institutions in the transfer, adaptation and adoption of agricultural technologies in Lebanon</u></p> <p>Moderator: Mr. Michel Afram – Director General – Lebanese Agricultural Research Institute (LARI) – Lebanon</p> <ul style="list-style-type: none"> • An overview of the strategy and vision of the National Council for Scientific Research (CNRS) in the transfer, adaptation and adoption of agricultural technologies- challenges and opportunities Mr. Talal Darwich – Project Manager – CNRS – Lebanon • An overview of the strategy and vision of LARI in the transfer, adaptation and adoption of agricultural technologies- challenges and opportunities Mr. Michel Afram – Director General – LARI – Lebanon • A new strategic approach for delivering innovative science based-solutions for thriving and resilient dry lands Mr. Hassan Machlab – Country Manager – International Center for Agricultural Research in the Dry Areas (ICARDA) – Lebanon

- **Case Study 2: Application of water saving techniques- findings and recommendations for large and small farmers**
Mr. Ihab Jomaa – Head of Irrigation and Agrometeorology Department – LARI – Lebanon
- **Case Study 3: Barley sprout production to reduce the cost of livestock feeding and pressure on rangelands**
Mr. Joseph Kahwaji – Head of Feed and Rangeland Lab – LARI – Lebanon
- **Q&A**

13:30-14:30 **Lunch break**

14:30-15:30 **Session 3: The role of the agriculture faculties in directing their research and programs to promote technology development in the agriculture sector**

Moderator: Mr. Elias Ghadban – Regional Advisor on Food Security – ESCWA

- **Strategy of the Faculty of Agriculture and Food Sciences (FAFS) at the American University of Beirut (AUB) and results achieved**
Mr. Ammar Olabi – Associate Dean – FAFS – AUB – Lebanon
- **Strategy of the Faculty of Agriculture at the Lebanese University (LU) and results achieved**
Mr. Samir Medawar – Dean of the Faculty of Agriculture – LU – Lebanon
- **Strategy of the Institute of Agricultural Engineering for Mediterranean Countries at the University of Saint Joseph (USJ) and results achieved**
Ms. Yolla Ghora Chamoun – Associate Professor – ESIAM –USJ – Lebanon
- **Q&A**

15:30-16:30 **Session 4: General discussion to draw lessons learned from morning sessions and propose policy recommendations tailored to design the principles of agricultural technology development within the strategy of the Ministry of Agriculture for 2020-2025**

Moderators: Ms. Wafa Dikah Hamze – Mr. Fouad Mrad –Mr. Elias Ghadban

Day 2: Tuesday 27 August 2019

- 9:00-10:15 **Session 5: Adoption of agricultural technologies by small and large farmers – Challenges and adaptation mechanisms**
- Moderator: Mr. Hussein Nasrallah – Minister Consultant – Ministry of Agriculture – Lebanon**
- **Growing, washing and packaging carrots: energy and water management and proper soil use**
Mr. Ahmad Osman Khodr – Agricultural Engineer from Beqaa – Lebanon
 - **Growing soilless vegetables under greenhouses in Jounieh**
Mr. Nagi Qamar – CEO – Smart Farm S.A.L – Lebanon
 - **Endorsement of Technology in the Lebanese farming system**
Mr. Bashar Berro – Agribusiness Expert – Lebanon
 - **Growing vegetables under a hydroponic system in the Bekaa valley**
Mr. Ahmad Zeiter – Agricultural Engineer from Beqaa – Lebanon
 - **Q&A**
- 10:15-11:30 **Session 6: Private sector's transfer and adoption of agricultural technologies – success stories and challenges**
- Moderator: Mr. Ibrahim Hawi – Minister Consultant – Ministry of Agriculture – Lebanon**
- **Agricultural systems that conserve our natural resources- transfer and application challenges**
Ms. Nadine El Khoury – Chief Operating Officer – Robinson Agri – Lebanon
 - **Agricultural technologies to support grape production in Northeast Baalbeck**
Mr. Ziad Ghanem – Central Technical and Development Manager – Debbane Agriculture Holding – Lebanon
 - **Hydroponic systems – the ability to increase productivity and the challenges of transfer and adoption**
Mr. Mazen Mneimneh – Executive Manager – Hydroponica – Lebanon
 - **Q&A**
- 11:30-12:00 **Coffee break**

12:00-13:30 **Session 7: The role of stakeholders' clusters in agriculture and start-up companies in the creation and support of context-based agriculture technologies**

Moderator: Ms. Hala Abdallah – Head of Economics and Marketing Department – Ministry of Agriculture – Lebanon

- **Case study 4: Experience of a cluster initiation for start-ups of agriculture technologies**
Mr. Ramy Bou Jawdeh – Deputy General Manager – Berytech – Lebanon
- **Lebanese agricultural food innovation- Initial impact on the sector and sustainability challenges**
Ms. Jihane Chahla – Cluster Manager – Berytech – Lebanon
- **Start-up 1: Rigino: Trust, Transparency and Traceability**
Ms. Sabah Corm – Co-Founder – Rigino
- **Start-up 2: IO Tree**
Ms. Nisrine El Turkey – Founder; CEO – IO Tree
- **Start-up 3: IoT-Connected CEVA (Controlled-Environment Vertical Agriculture): Harnessing scalable cutting-edge technology to transition Lebanese agro-production into the 21st century**
Mr. Ali Makhzoum – Founder; CEO – LifeLab
- **Q&A**

13:30-14:30 **Lunch break**

14:30-15:30 **Session 8: The role of non-governmental organizations and development agencies in agriculture technology's adoption and transfer**

Moderator: Ms. Amal Salibi – Head of the Economic Studies and Statistics Department – Ministry of Agriculture – Lebanon

- **Case study (5) of United Nations Development Programme – Lebanon: “Innovative Solutions in Rangelands Management: A Practical Experience from the Qaraoun Catchment”**
Mr. Dominique Choueiter – Project Officer – United Nations Development Programme (UNDP) – Lebanon
- **Case study (6): Polish Center for International Aid (PCPM)**
Mr. Andre Abou Haidar – Programme Officer – PCPM – Lebanon

- **Case study (7) of Lebanon Reforestation Initiative – Lebanon :**
“Using GIS to guide decision making processes in reforestation”
 Mr. Joseph Bechara – GIS Expert – Lebanon Reforestation Initiative – Lebanon
- **Case study (8) of the Chamber of Commerce Industry and Agriculture in Zahle: “Agvisor to increase micro, small and medium agricultural enterprises’ productivity”**
 Mr. Said Gedoun – Deputy General Manager – Chamber of Commerce Industry and Agriculture in Zahle

15:30-17:00 **Session 9: Closing Session**

General discussion to draw lessons learned from morning sessions and propose policy recommendations tailored to design the principles of agricultural technology development within the strategy of the Ministry of Agriculture for 2020-2025

Moderators: Ms. Amal Salibi – Mr. Hussein Nasrallah – Mr. Fouad Mrad – Mr. Elias Ghadban