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NARC
المركز الوطني للبحوث الزراعية
National Agricultural Research Center

Focus Group Discussion Report

Farmers' Attitudes Towards Biosolids use in Agriculture: Evidence from Jordanian Badia

Tracing soil amendment impacts of the biosolids on the rehabilitation of Jordan's agro-pastoral areas (TRACE Rehab)

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I. Background

The biosolids, originating from the treated sewage sludge, is the organic product of the sewage treatment system, rich in organic matter and nutrients, especially nitrogen and phosphorus, with agricultural potential for isolated use or in combination with mineral compost (Lemainski and Silva, 2006a). Thus, the agricultural recycling of biosolids is a viable alternative for the final destination, since besides the acknowledged presence of several nutrients in its composition; there is an equivalence of performance when substituting the chemical fertilizers (Backes et al. 2009; Adair et al. 2014). The land application of biosolids is widely accepted worldwide. However, it is critical to consider biosolids characteristics and application rates to avoid potential negative effects of soil enrichment, e.g. salinity, metal toxicity, and promotion of weedy and undesirable plant species. On an international level, land application of biosolids is still the most widely used management approach. For instance, in the USA over 50% of the produced biosolids are land applied. Land application is not only relevant for agricultural production, but also for land restoration

In Jordan, several standards concerned for further assessment of the quality, use, transport, and disposal of the biosolids. Standards of the Ministry of Agriculture (MoA) don't allow biosolids to be used in agriculture yet; therefore, there is no reuse of biosolids in the agricultural sector. Ministry of Agriculture is taking care of the agriculture reputation and export quality and standards related to agriculture inputs. Furthermore, biosolids are not directly reused for any other purpose in Jordan. The only exception is the biosolid of Al Samra wastewater treatment plant (WWTP), where the biosolids are being used for biogas production through anaerobic digestion to produce electricity for running the facility. The Ministry of Environment (MoEnv) sets specific standards on the types, transportation, and places to use it. The MoEnv law of: 'Instructions of Organizing the Storage, Transport, and Treatment of Organic fertilizers and their Trading for 2009' and MoA: 'Instructions for the Requirements of Licensing, Preparation, Storage, Handling and Trading of Fertilizers and Plant Growth Regulator for 2011' prohibit the production of organic fertilizers from biosolids, and refer to JS 962 (2011). The Ministry of Water and Irrigation (MoWI) has set several monitoring programs for biosolid monitoring, treatment, and use which are well bounded by national and international standards and protocols. In Jordan, the standard JS 1145 (2016) regulates the production, transportation, and reuse of biosolids. JS 1145 (2016) classifies biosolids into three classes and restrict the final fates of each class. Type I and Type II sludge can be used as a soil amendment in rangelands and Type III sludge can only be transported to sanitary landfills. The standard makes no clear distinction between Type I and Type II sludge in terms of selected crops, rates of applications, and conditions of application. The maximum rate of application for both Type I and Type II sludge is 6 tons/ha per year, and soil amendment with biosolids can only be performed in areas with less than 200 mm of average annual rainfall.

Suleiman et al., (2010), indicated that the biosolids of Jordan are with higher quality concerning heavy metals content and are far below the limits indicated in the JS 1145 (2016) and besides that, the high nitrogen content is high which found to be around 4% for biosolids from the Wadi Mousa and Wadi Hassan WWTPs.

It is important to note that there are additional opportunities for the reuse of biosolids than just land application and landfilling. For instance, biosolids could be used in cement kilns as an alternative energy source or in incineration plants for energy recovery. Also, the biosolids can be converting to biochar (carbonaceous material) that can be used as a soil amendment (Breulmann et al. 2015). The carbonization removes pathogens and can potentially degrade thermally labile pollutants, enabling the sustainable recovery of plant mineral nutrients that are present at high levels in sludge (Libra et al. 2014).

Independent on the crop that will be planted, the attractiveness for the rural farmers opting for organic fertilization is increased when the cost-effect relationship is considered favorable. Thus,

organic fertilization is one of the most important ways to improve soil quality and prevent it from drifting. Through fertilization, we return the organic matter, which is consumed by the plants, to the soil –and this improves soil structure. Organic matter binds soil granules to each other and prevents them from drifting. If we add organic fertilizer to the sandy soil, it will be able to store more water and become rich in nutrients. Indeed, the farmyard manure that can be obtained from the fermentation of plant residues such as hay, wood, larch, market, leaves, etc., with great influence of microbes spread everywhere and suitable for special conditions. The use of compost (composted plant and animal materials) to maintain or improve soil organic matter is supported by many research and development organizations given its multiple benefits as a soil amendment and a source of organic matter by improving soil biological, chemical, and physical characteristics.

Within the activities of "Tracing soil amendment impacts of the biosolids on the rehabilitation of Jordan's agro-pastoral areas (TRACE Rehab)" project, the socio-economic research directorate at the National Agricultural Research Center (NARC) in collaboration with the International Center for Agricultural Research in the Dry Areas (ICARDA have conducted a focus group discussion (FGD) workshop as a baseline with men at Al Majeddyeh community on Tuesday the 23rd of June 2020. The use of this method is justified by the fact that provides immediate responses and face to face to gathering the feelings and thoughts of the community about the study issue and provides insights into how people think and give a deeper understanding of the phenomena being studied.

This way, this technical report synthesize some of the issues relevant to achieving a practicable and affordable balance in sustainable biosolid and compost management, the purpose of this work is to investigate farmers' perceptions assessment of their acceptability, and beliefs on land application of biosolids and compost on their farms/agro-pastoral communities with special focus on their attitudes towards the use of biosolids and compost and key potential factors influencing farmers to use or no use decisions.

II. FGD Implementation Process

To implement this FGD process, there were several previous preparations and calls with the community to choose the appropriate time and date for the focus group session members. Consequently, A pre-prepared checklist questions were designed for a focus group to stimulate rich conversation for that a list of questions were opened-ended, with no particular answer, with "How" or "What" and some questions with "Do".

Dr. Masnat Al- Hiary, Director of the Socioeconomic Studies Directorate at NARC, conducted the FGD meeting with her NARC socio-economic researchers' team. Dr. Masnat Al- Hiary facilitated the discussion, while the researchers took notes, feedback, and photos. Of course, due to the Corona pandemic (COVID 19) that hit the region three months before the workshop, there was an obligation from everyone participated to take health measures, including wearing gloves and medical masks, and organized discussion with a selected group and arranged the meeting place in a large room where the seating places (chairs) were spaced out.

A total of 16 men from Al Majeddyeh community participated in the focus group meeting, and Dr. Masnat Al- Hiary the project coordinator from NARC with the socioeconomic researchers' team Eng. Omamah Al- Hadidi, Eng. Malek Abu Romman, Eng. Ala'a Al_Awaydah, Eng. Alaa Al Abdallat and Eng.Raghda Daradka have also participated in the FG meeting. The focus group meeting was conducted in Al Majeddyeh Charity Association hall, which was established in 2011 and is located in the center of the village with a total of (38) members including (8) women.

After welcoming the group participant and introducing them to the socioeconomic team, Dr. Masnat Al- Hiary mentioned the aim of holding this focus group meeting including the goal of the study and how the information will be used. Al Majeddyeh focus group was lasted for 60 minutes asking them questions and probing for detailed answers, the first 10 minutes was for introductions and explanations of the objective of the study, 23 questions were in the discussion focus group checklist in addition to the general information about the community. The ground rules for the discussion were put such as raising your hand to share a comment and encourage the participants to give their perceptions assessment of their acceptability for the study questions.

III. FGD Outcome

1. General information

The study target group is Al Majeddyeh village which was established in 1995. It is located southeast of the capital, Amman, east of Queen Alia International Airport. Al Majeddyeh residents work in raising sheep, as it is considered the main job in the first-class then some of them are working in planting barley, military jobs, free professions, and governmental jobs. The educational level of the Al Majeddyeh community is secondary, sub-secondary and 10% of the community has a bachelor's degree.

Cooperative societies in Al Majeddyeh: There are no cooperative societies, there are two charities Associations (Al Majeddyeh Charitable Society for Men, Al-Mataba'a Charitable Society for Women), the total number of the population of Al Majeddyeh is about 300 individuals according to the farmers. Cultivated crops are barley and olives trees, only 5% of the community land considered as natural pastures due to frequent tillage, the types of plants which are familiar in the past in the community was Al-Shalwa (*Avena Sterilis*), Al-Qubbah (*Eremopoa Persica*))(a wild plant preferred by livestock), Al-Khafoor (*Sisymbrium*) (*Schismus Arabicus Nees*), Al-Qataf (*Atriplex halimus*), and Al-Otho (*Anabasis Lachnantha)*. Nearly from 2 -3 months the sheep are

grazing on pastures (crops/wild plants) while the rest of the months, farmers purchased the fodder, the average size of the land tenure is 30 – 50 dunums.

2. Fertilizers and their uses

The main types of fertilizers which farmers use is the dry manure and they are considering it as organic fertilizer, only one farmer uses chemical fertilizer for olive trees, and he is not satisfied with this source of fertilizers. It was also found through discussion and dialogue that farmers don't know how to treat manure and manufacturing compost. They have no idea of how to treat non- fermented manure to produce fertilizer and also how to differentiate between the treated and the untreated fertilizers, as they use the livestock manure after it dries up (it has been shown that the use of sheep dung on the ground will cause an increase in the salinity of the soil).

It was clarified that the accumulation of treated bio-solid waste constitutes an environmental problem in the region and has been studied globally and is subject to treatment processes to avoid potential health risks and will not be used for agriculture, but will be used to improve the quality of poor soil in remote places. Dr. Masnat Al- Hiary explained of how to convert and ferment animal dung with plant and household agriculture waste where animal waste is mixed in a ratio of 3: 1 with plant waste and buried in the soil on a tunnel for three months to obtain the fermented organic fertilizer in an ideal way without smell and does not cause the gathering of flies. It was a clarity that farmers need to attend useful practical and theoretical training related to how to establish a manure treatment unit in the community and they were satisfied and looking forward to the training. The discussion revealed also the exiting of some factors influencing farmers' purchasing decisions of fertilizers such as:

- Price of fertilizer price
- Nutrient content
- Organic matter
- Knowledge of a person who used
- Country of origin

3. Bio Solids Knowledge and Perception: Key findings

Farmers heard from ICARDA and NARC team and have information about biosolids concept, but they are not willing to use biosolid in the rangelands, this is for the following reasons:

- Do not trust that sludge is suitable;
- Concern about consumers attitude;
- Special needs are associated with sludge use;
- Unpalatable to animals, as the animals refuse to get close to the area where there is biosolid.
- It is not accepted by the human soul.
- Contradicting religion and Sharia (religiously rejected).

Farmers thought that using biosolids will affect the environmental situation in the community and the reasons from their point of view are: it will cause diseases to children (harmful to humans and cause toxins), it was previously forced to use chemicals, but the option to use sludge is the worst, the government has destroyed arable land and build houses and buildings and now they want to destroy the desert, which is not suitable for cultivation, The effect of using biosolids will remain on products in the long run like the chemical fertilizers. Moreover, farmers thought that biosolids are not a good alternative to existing resources (chemical, direct manure) and it is not better than available resources (Chemical) and can't be used for all crops (They rejected the concept).

Dr. Masnat Al- Hiary clarified and explained that the accumulated solid waste constitutes an environmental problem in the region. Biosolids have been studied globally and subjected to many treatment processes to avoid potential health risks and the treated biosolid will not be used for agriculture, it will be added to the soil as fertilizers to improve the soil's fertility in Badia far away.

Dr. Masnat Al- Hiary mentioned that biosolid is considered a waste and we have to get rid of it properly and we can use it for making compost to enhance the soil physical properties in the Badia region. Many problems are facing farmers when they use chemical fertilizer, they thought that most people suffered from health problems and physical problems due to the use of fertilizers and chemicals in food and its accumulation, also due to chemical usage the fruits and vegetables lost their distinctive taste and flavor. According to farmers the following are the impacts of using chemical fertilizers:

- Affect human health;

- Pollute of the environment;
- It affects the soil due to the accumulation of salts and the depletion of large quantities of salts;
- Change the seed quality.

Framers opinion solutions to increase land fertility is to stop using chemicals from their point of view, no problems are facing when using of the non-fermented fertilizer, but they believe that manure improved the soil and preserve moisture (as their soil is characterized by its high permeability, the manure added to the soil to conserve water and improve the soil texture). While the fermented fertilizers do not use it and they don't know the advantage of using it.

At the end of the session, Dr. Masnat Al- Hiary thanks the participants for attending the meeting and contributing to enriching the discussion.

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I. References

Adair, KI., Wratten, S., Barnes, AM., Waterhouse, BR., Smith, M., Lear, G., Weber, P., Pizey, M., Boyer, S., 2014. Effects of biosolidss on biodiesel crop yield and belowground communities. Ecol. Eng. 68, pp:270-278.

Backes, C., Büll, LT., Godoy, LJG., Bôas, RLV., Lima, CP., Pires, EC., 2009. Uso de lodo de esgoto na produção de tapetes de grama esmeralda. Cienc. Rural 39, pp:1045-1050

Breulmann, M., van Afferden, M., Fühner, C., 2015. Biochar: Bring on the sewage. Nature 518, 483.

Breulmann, Marc & Müller, Roland & Al-Subeh, Anwar & Subah, Ali & van Afferden, Manfred., 2020. Reuse of Treated Wastewater and Biosolids in Jordan – Nationwide Evaluation.

JS 893, 1995. Jordanian Standard for Water — Treated Domestic Wastewater. In: Jordan Standards and Metrological Organization, Amman, Jordan.

JS 893, 2002. Jordanian Standard for Water — Reclaimed Domestic Wastewater. In: Jordan Standards and Metrological Organization, Amman, Jordan.

JS 893, 2006. Jordanian Standard for Water — Reclaimed Domestic Wastewater. In: Jordan Standards and Metrological Organization, Amman, Jordan.

JS 962, 2011. Jordanian Standard for Organic Fertilizers and Soil Conditioners. In: Jordan Standards and Metrological Organization, Amman, Jordan.

JS 1145, 2016. Jordanian Standard for Sludge — Uses of Biosolids and Disposal. In: Jordan Standards and Metrological Organization, Amman, Jordan.

Lemainski, J., Silva, JE da., 2006a. Avaliação agronômica e econômica da aplicação de biossólido na produção de soja. Pesqui Agropecu Bras 41(10), pp:1477-1484.

Libra, J.A., Ro, K.S., Kammann, C., Funke, A., Berge, N.D., Neubauer, Y., Titirici, M.M., Fühner, C., Bens, O., Kern, J., Emmerich, K.-H., 2014. Hydrothermal carbonization of biomass residuals: a comparative review of the chemistry, processes, and applications of wet and dry pyrolysis. Biofuels 2, 71-106.

Suleiman, W., Gerba, C.P., Tamimi, A.H., Freitas, R.J., Al Sheraideh, A., Hayek, B., 2010. Management Practices of Sludge and Biosolid Treatment and Disposal in Jordan. Journal of Residuals Science & Technology 7, 63-67.

ANNEXES

Annex I
Focus Group Discussion Check List Instrument
(English Version)

Farmers' Attitudes Towards Biosolids use in Agriculture: Evidence from Jordanian Badia

Context of the Focus Group Discussion (FGD) Approach

In the frame of the project on "*Tracing soil amendment impacts of processed wastewater sludge on the rehabilitation of Jordan's agro-pastoral areas (TRACE Rehab)*", the International Center for Agricultural Research in the Dry Areas (ICARDA) and the National Agricultural Research Center (NARC) teams in Jordan are conducting an FGD in *Al Majeddyeh* with the purpose to gather qualitative data to gain an in-depth understanding farmers' perceptions of land application of biosolids on their farms/agro-pastoral communities.

The data collected will be useful to assess farmers' perceptions and attitudes of the biosolid- and to define potential factors influencing their willingness to use /or not this type of fertilizer. Thus, understanding farmers' perceptions and opinions about the use of sludge-based compost (*biosolids*) will ensure the capitalization of the existing opportunities to address the dual challenge of waste management and soil nutrient depletion in Jordan via the safe recovery of nutrients from both solid and liquid waste streams for reuse in agriculture.

General Information

Governorate

Village

Date of the discussion

FGD Framework Check List

- Types of cultivated crops:

- What types of plants in the natural pastures per season (spring, summer, etc.) you are familiar with?
- How did you assess the quality of natural pastures to livestock? (a) good (b) moderate (c) bad

- How long time are sheep grazing on pastures (crops/wild plants)? No. of months

1. In natural pasture (no intervention + no Barley planted)
2. In cultivated areas with barley in the hillslope's areas (after harvesting of barley)
3. In cultivated areas with barley in the low slope's areas (Marabs) after harvesting (not ICARDA intervention).

- What is the average size of the cultivated land?
    - In Al Majeddyeh
    - Outside Al Majeddyeh

- What are the types of used fertilizers (organic fertilizer, chemical fertilizer)?

- If you are using fertilizers (chemical or organic),
    - Average quantity purchased/used per HH (Chemical……Organic…..)
    - Sources of the fertilizer: Chemical…….Organic….
    - Satisfaction with the existing sources of fertilizers? Chemical (1. Yes 2. No); Organic (1. Yes 2. No)
- Do you know how to treat organic fertilizer?
- Are you willing to establish a manure treatment unit in the community?
- What are the advantages of treated organic fertilizer?
- What are the factors that influence your /farmers' purchasing decisions?
    - Price of fertilizer price
    - Nutrient content
    - Organic matter
    - Knowledge of a person who used
    - Country of origin
    - Other (Specify)
- Do you know about biosolids?

- Are you willing to use biosolid in the rangelands? 1. Yes, 2. No
- If No, this is because:
    - a. Do not trust that sludge is suitable;
    - b. Concern about consumers attitude;
    - c. Special needs are associated with sludge use;
    - d. Others, Specify; _____
- How do you think using biosolids will affect the environmental situation in your community?

- Are you willing to use biosolids? 1. Yes, 2. No

- If yes, do they think that biosolids are a good alternative to existing resources (chemical, direct manure)?
  (a. Very much; b. Much; c. Do not know; d. No; e. Definitely not)

- Do you think that biosolids are better than available resources (Chemical)?
  (a. Very much; b. Much; c. Do not know; d. No; e. Definitely not)

- Do you think that biosolids can be used for all crops? 1.Yes, 2. No
- What are the problems of rangeland soils?
- What problems are facing farmers when they use chemical fertilizer?
- In your opinion, what are the solutions to increase land fertility?
- What problems are facing farmers when they use organic fertilizer (fermented or non- fermented)?
- In your opinion, what are the potential solutions to overcome the above problems?

Annex II
Focus Group Discussion Check List Instrument
(Arabic Version)

تتبع آثار تعديل التربة من المواد الصلبة الحيوية على إعادة تأهيل المناطق الزراعية والرعوية في الأردن

مجموعة عمل (Focus Group)

المحافظة :

القرية :

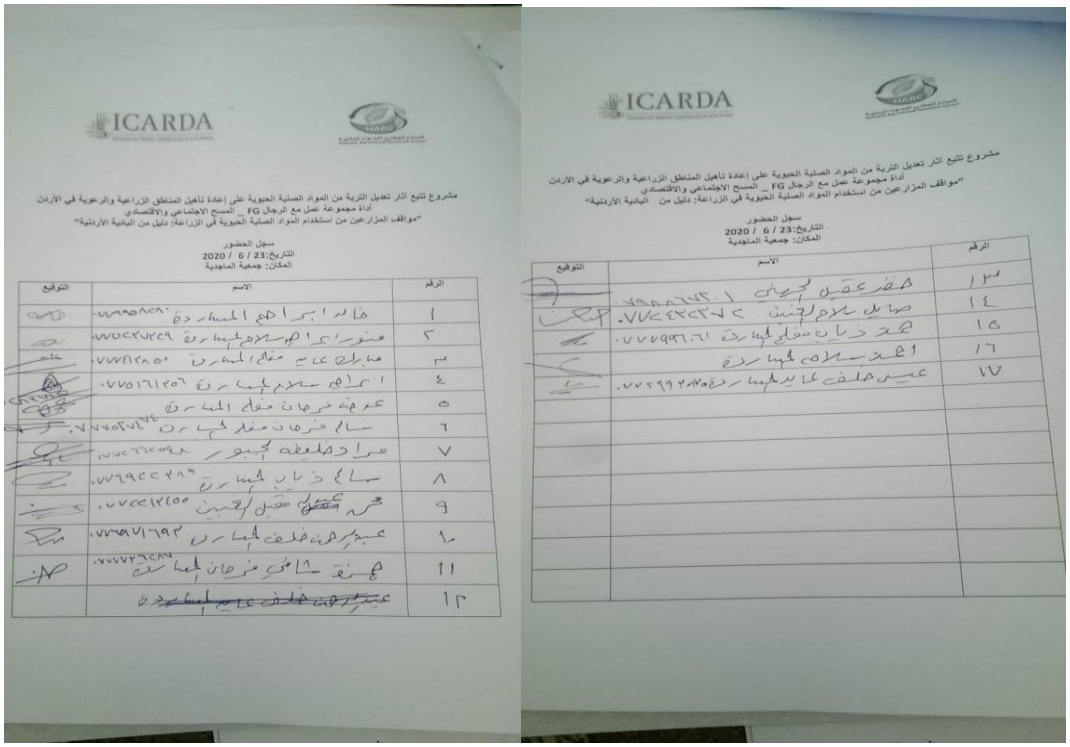
تاريخ المناقشة :

- تاريخ انشاء تجمع الماجدية :
- أنواع المحاصيل المزروعة :
- انواع النباتات في المراعي الطبيعية :
- الفترة التي ترعى فيها الأغنام في المراعي (محاصيل / نباتات برية) ؟ عدد الأشهر _____
- ما هو معدل مساحة حيازة الاراضي ؟
- انواع الاسمدة المستخدمة (سماد عضوي ، سماد كيماوي) ؟
- اذا كنتم تستخدمون السماد العضوي أو الكيماوي ، هل انتم راضون عن مصادر هذه الاسمدة ؟ 1. نعم 2. لا
- هل لديكم معرفة بكيفية معالجة السماد العضوي ؟ 1. لا 2. نعم
- ما هي ميزات السماد العضوي المعالج؟
- ما هي العوامل المؤثرة في قرارات شراء الاسمدة (سعر السماد، المحتوى الغذائي، المواد العضوية ، معرفة شخص تم استخدامه ، بلد المنشأ .....) ؟
- هل لديكم معرفة بالحمأة المعالجة ؟ 1. لا 2. نعم
- هل لديكم استعداد لتجربة استخدام الحمأة المعالجة في المراعي ؟ 1. لا 2. نعم
- اذا كانت الاجابة لا ، فهذا بسبب :
  - لا تثق في أن المواد الصلبة الحيوية مناسبة
  - القلق بشأن موقف المستهلكين
  - ترتبط الاحتياجات الخاصة باستخدام المواد الصلبة الحيوية
  - أخرى ؛ حدد _____
- كيف تعتقد أثر الحمأة المعالجة على الوضع البيئي ؟
- مدى قابلية المزارعين لاستخدام سماد عضوي مصنَع من مخلفات بشرية ؟
- هل تعتقد أن المواد الصلبة الحيوية هي بديل جيد للموارد الحالية (الكيميائية)؟ (1. كثير جدا 2. كثيرا 3. لا أعرف 4. لا 5.بالتأكيد لا)
- هل تعتقد أن المواد الصلبة الحيوية أفضل من الموارد المتاحة ؟ (1. كثير جدا 2. كثيرا 3. لا أعرف 4. لا 5.بالتأكيد لا)
- هل تعتقد أن المواد الصلبة الحيوية المعالجة يمكن استخدامها لجميع المحاصيل ؟ 1. لا 2. نعم
- المشاكل التي تواجه المزارعين المتعلقة بالسماد الكيماوي ؟
- من وجهة نظركم ، ما هي حلول المشاكل المتعلقة بالسماد الكيماوي ؟
- المشاكل التي تواجه المزارعين المتعلقة بالسماد العضوي المخمر و غير المخمر ؟
- من وجهة نظركم ، ما هي حلول المشاكل المتعلقة بالسماد العضوي المخمر و غير المخمر ؟

Annex III
List of Attendees – FGD – 23 June 2020
Al Majeddyeh - Jordan

No.	Name	Mobile No.	Position
1.	Khaled Ibraheem El Masardah	0779958280	Farmer
2.	Menwer ibraheem El Masardah	0775237329	Farmer
3.	Moubarak Ayed El Masardah	0777412850	Farmer
4.	Ibraheem Salameh El Masardah	0775161356	Farmer
5.	Oweth Farhan El Masardah		Farmer
6.	Salem Farhan El Masardah	0777537474	Farmer
7.	Murad Khalefah Al Jboor	0772662548	Farmer
8.	Salem Theyab El Masardah	0776922389	Farmer
9.	Mohammad Abd ALLAH Al Gbeen	0772213455	Farmer
10.	Abd Al Rohman El Masardah	0776971693	Farmer
11.	Hamzah Shafi El Masardah	0777736287	Farmer
12.	Khather Eqeel Al Johayni	0798867301	Farmer
13.	Sayel Salameh Al Gbeen	0772432372	Farmer
14.	Hamad Theyab El Masardah	0777996061	Farmer
15.	Ahmad Salameh El Masardah	-	Farmer
16.	Issa Khalaf El Masardah	0772493875	Farmer
17.	Dr. Masnat Al- Hiary	-	NARC
18.	Eng. Omamah Al -Hadidi	-	NARC
19.	Eng. Malek Abu Romman	-	NARC
20.	Eng. Ala'a Al_Awaydah	-	NARC
21.	Eng. Alaa Al Abdallat	-	NARC
22.	Eng. Raghda Daradka	-	NARC
23.	Khaldoon Al Eleami	-	NARC

Note: *Personal information including Name, Business Title, Email, Phones, Images and GPS points included in this report have been authorized in writing or verbally by the data subject.*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مشروع تتبع اثار تعديل التربة من المواد الصلبة الحيوية على إعادة تأهيل المناطق الزراعية والرعوية في الأردن
اداة مجموعة عمل مع الرجال FG _ المسح الاجتماعي والاقتصادي
"مواقف المزارعين من استخدام المواد الصلبة الحيوية في الزراعة: دليل من البادية الأردنية"

سجل الحضور
التاريخ:23/ 6 / 2020
المكان: جمعية المناجدة

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مشروع تتبع اثار تعديل التربة من المواد الصلبة الحيوية على إعادة تأهيل المناطق الزراعية والرعوية في الأردن
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سجل الحضور
التاريخ:23/ 6 / 2020
المكان: جمعية المناجدة

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