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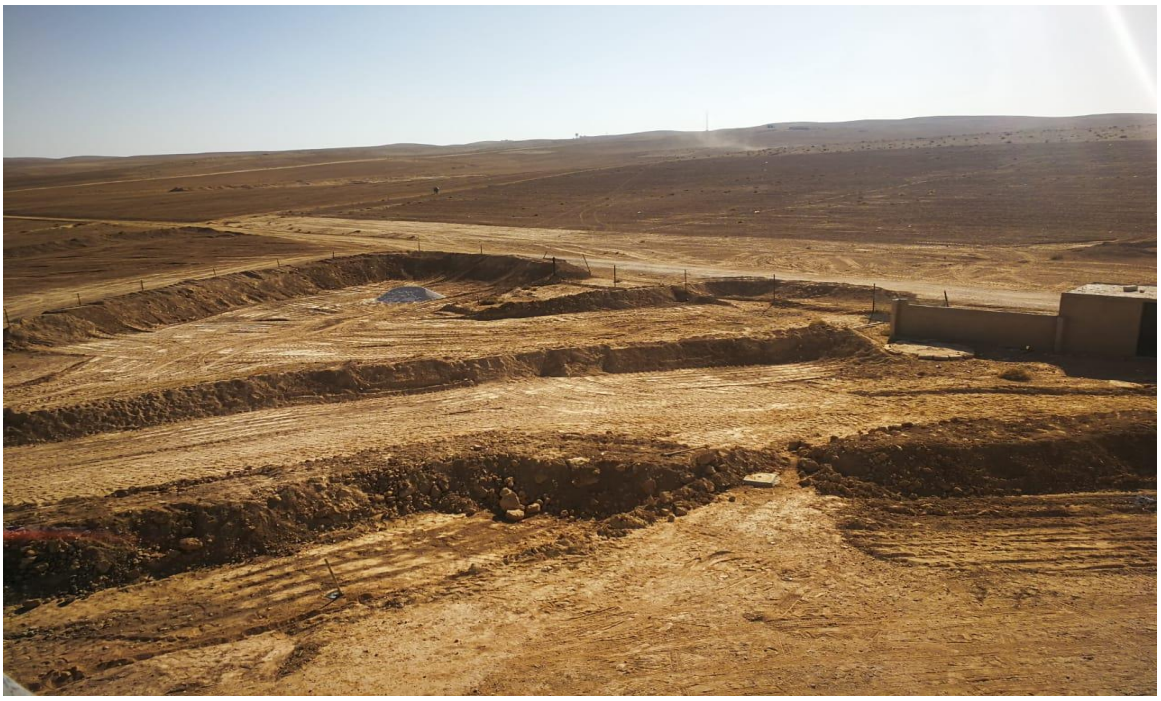
NARC
المركز الوطني للبحوث الزراعية
National Agricultural Research Center

MONITORING TECHNICAL REPORT

IMPLEMENTATION AND MONITORING OF PERMACULTURE (WATER HARVESTING TECHNIQUE) IN AL MAJDYAH (JORDAN)

(AFESD ICARDA-NARC Jordan Socio-Economic Team)



Strengthening Innovation and Technology Adoption towards Sustainable Agricultural Productivity in Arab Countries

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INTRODUCTION

Based on what was agreed in the first meeting with the men's group on Wednesday 9/10/2019 in the village of Al Majidyya, southeast of Amman to study the area and to determine the suitability of the area for using water harvesting techniques in a permaculture method, which is the use of Swales technique for water harvesting, NARC researchers Eng. MajdyAladwan, Eng. MalekAburomman, Mr. Ehab Mhawsh, Eng. Tayseer Aladwan, Dr. Zaid Alskarneh, Eng. Alaa Alawaydah conducted a prospection field day on Wednesday 23/10/2019. Following this visit, an implementation plan of permaculture technique has been established. In the following sections, we present a synthesis of the filed work conducted during the last period.

SYNTHESIS IMPLEMENTATION OF PERMACULTURE FRAMEWORK

STAGE 1: Field Visit on 19/11/2019

The Third visit to Al Majidiya village on Tuesday 19/11/2019 to implement the Swales and the water pond.

- Work Team (Permaculture design team):
  - Dr. Masnat Al-Hiary
  - Dr. Ahmad Abed Alfatah
  - Mr. Ihab Mhawesh
  - Eng. Malek Aburomman
  - Eng. Ala` Alawaydeh
  - Eng. Alaa Alabdallat

- The purpose of the visit:

- Drilling of Swales and water pond according to the plan that was designed in the first visit and according to the methodology specified.

- Results of the visit:

Implementation of the establishment of identified water harvesting techniques:

1- Drilling three Swales: the flow of each swale was dug in principle, in addition to collecting the soil resulting from digging the stream of swales underside of it to create terraces which will be planted.

2- Digging a water pond (No. 1)

AutoCAD Farm Illustration:

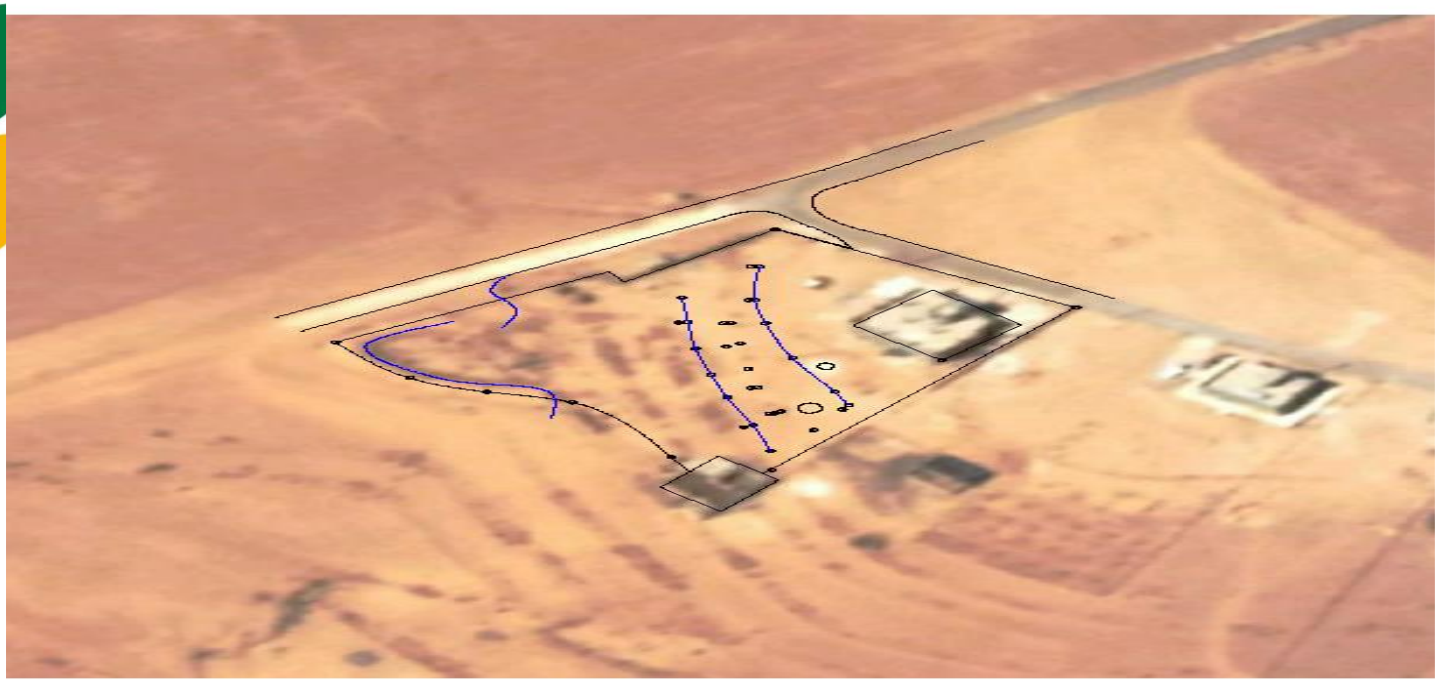
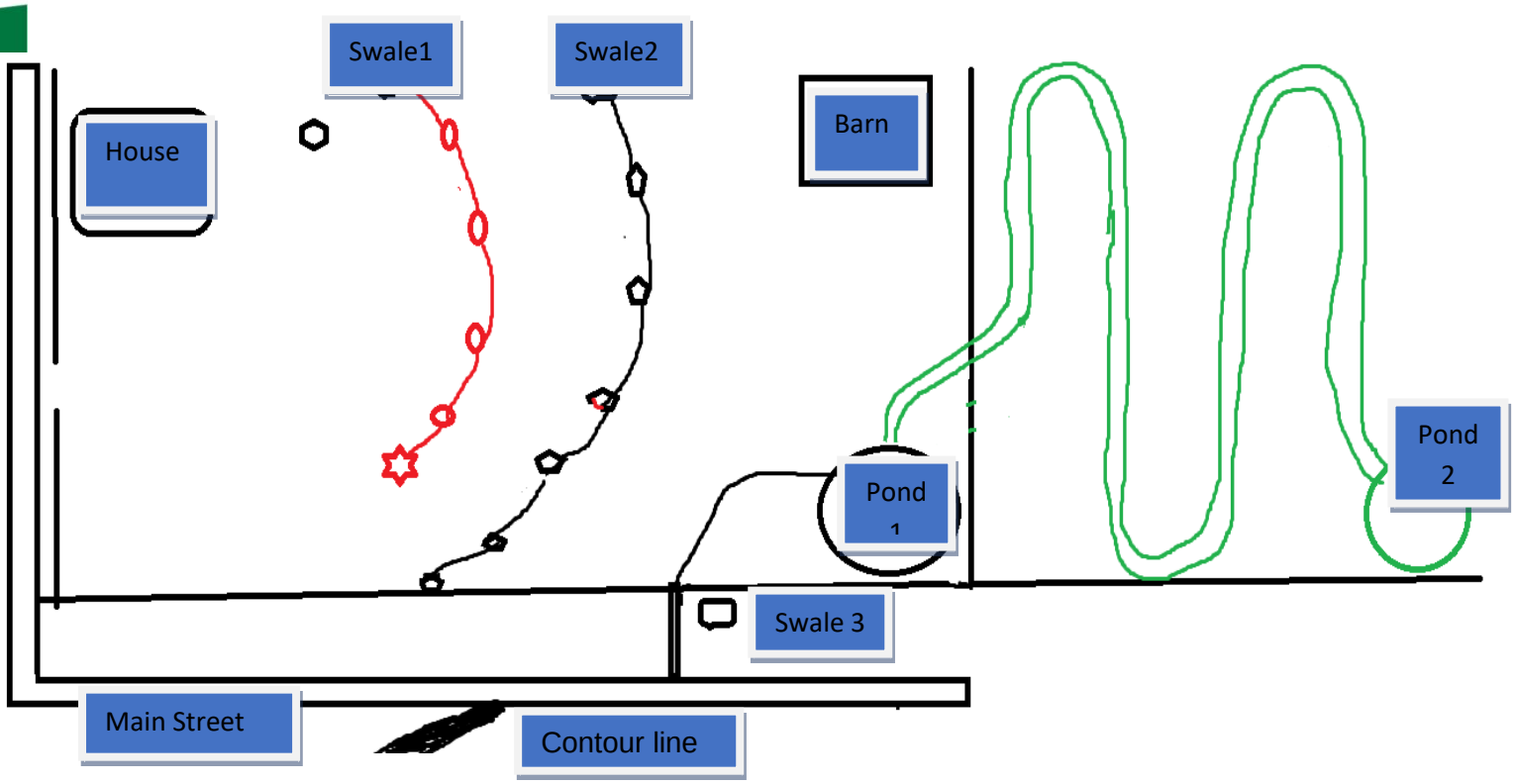


Illustration of the farm selected for the implementation of water harvesting techniques:



Explaining of the carried out activities:

- Drilling (3) Swales: (2) Swales inside the plot (Start and end inside the plot), and (1) Swale start from outside the plot to divert the water of the main street to the beginning of the third Swale which connecting to the water pool No (1).
- Digging a water pond No (1): (Transformable water pool): The running water from the plot which opposite the site towards from the southern side of the farm will be diverted to the main street through water harvesting channel then flow into stream of third Swale (No.3).

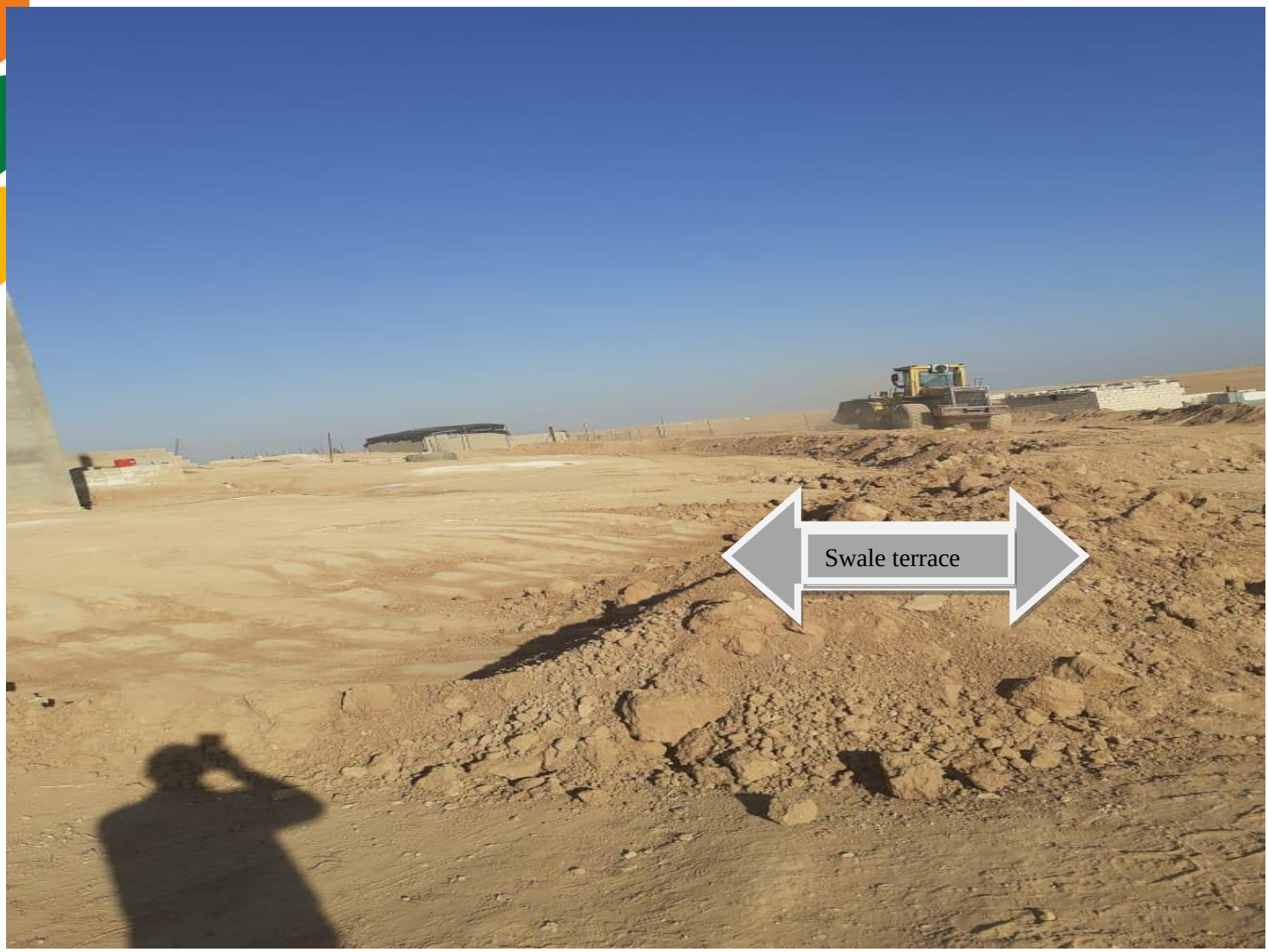
Steps to create a Swale:

1- After determining the points along the flow of the Swale through using the Total station tool, the mechanism has determined the flow of swale from the beginning to the end and fragmented the soil.

2- Digging the interior part of the Swale and put the soil resulted up the lower end of the Swale

Swale interior

3- By using the mechanism, the soil resulted from the digging of the interior of the Swale arranged, compacted and placed on the lower end of the swale to make the Swale terrace

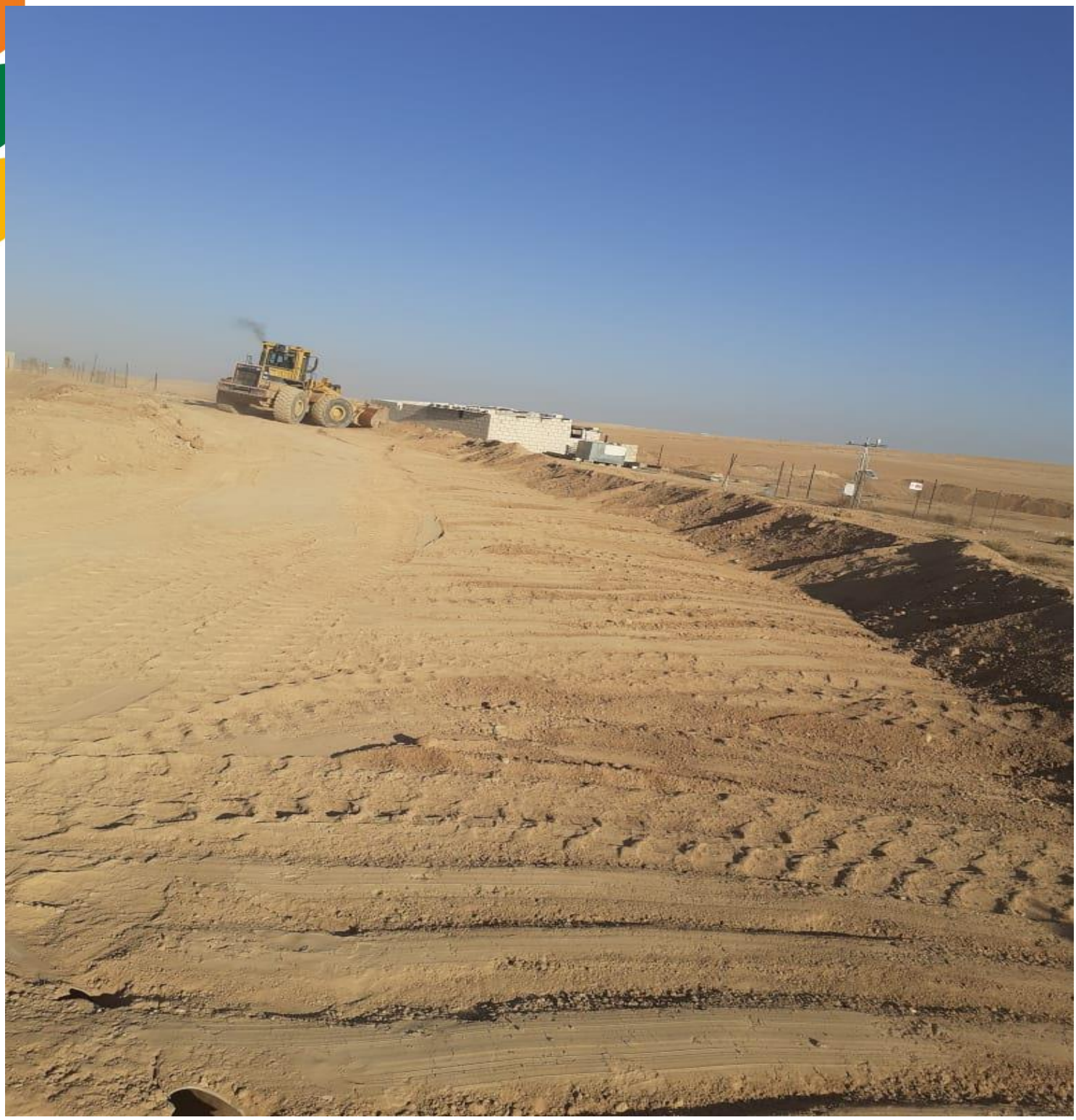

Swale terrace

Photos of the implementation of Swales:

A contour line to turn part of the rain falling on the hill which is opposite to the house to fall into the main street which will feed the third swale

The contour line


Turn the rain to the main



STAGE 2: Field Visit on 28/11/2019

During the fourth visit to Al-Majydia village at Muwaqqar on 28/11/ 2019, the implementation of the second part of the project started.

- Work Team (Permaculture design team):
  - Dr. Masnat Al Hiary
  - Dr. Ahmad Abed Alfatah
  - Eng. Majdy Aladwan
  - Mr. Ihab Mhawesh
  - Eng. Oday Alna`emat
  - Eng. Ala` Alawaydeh
  - Eng. Alaa Alabdallat
  - Mr. Ali Madallah

- The implementation of the second part of the project in Al-Majidiya area started with three steps:
  - I- Put the wicking bed in a suitable place (zone 1)
  - II- Roof top Water harvesting of the house (zone 0)
  - III- Create channels along the swalles (1+2) and digging holes to be planted (zone 1)

Clarify the implemented steps:

I- Wicking bed:

Four used plastic tanks were brought with dimension of (length 1.2m, width 1m, height 1m), each tank was cut from the middle to become eight, and then the tanks were placed after cutting them beside each other as a kind of protection due to the nature of the strong and cold winds in the area.

When choosing the place where to put the tanks, we consider several factors, including:

1) The slope of the earth
2) Availability of the sun and wind direction
3) The aesthetic of the place

The farmer was trained how to make the wicking bed and then we asked him to complete the rest tanks so he can teach other farmers now.

Steps of making wicking bed:

1- After cutting the tank we will have two pieces

2- Putting pipe (L shaped) starting from the bottom and it must be perforated from down part to allow the water to flow for the tank; the pipe must be suitable in lengths and dimensions with the tank size

3- Add gravel on the pipe and covering the pipe to save and absorb water

4- Open a hole as drainage above the gravel

5- Put clothes or mulches at the top of the gravel level (the clothes or mulch must allow water access)

6- Add soil above the clothes or mulch

II- Water harvesting for house roof (zone 0)

- Initially, the most suitable place on the roof of the house was identified to collect water according to the slope, and then a tube was extended from the top of the roof to the ground tank to collect water in it.

III- Arrange the swales bench , create channels along the swales (1+2) and dig holes to be planted

1- Arrange and coordinate the Swale bench

2) Putting a manure, mixing it with straw, and putting it inside the Swales

3) Dig a channel along the Swale Stream

4) Digging holes inside the Canal that was previously designed to plant trees

Digging holes

5- On the opposite side of the channel (interior Swales) pits were drilled for planting with trees

STAGE 3: Field Visit on 05/12/2019

The fifth visit to Al Majidiya village on Thursday 5/12/2019 in order to finish the harvesting water techniques which was implemented in the land of the selected farmer.

- Work Team (Permaculture design team):
  Dr. Masnat Al Hiary
  Dr. Ahmad Abed Alfatah
  Eng. Majdy Aladwan
  Eng. Malek Aburomma
  Eng. Tayseer Aladwan
  Eng. Ala` Alawaydeh
  Eng. Alaa Alabdallat
  Eng. Yousef Alkhawaldeh

- The purpose of the visit:

⟹A- Planting the Wicking bed
⟹B- Digging the holes in the swale (1) channels`
⟹C- Digging channel of the swale (2) besides digging the holes

Clarification of the implemented activities:

A- Planting the Wicking beds

In the previous visit, wicking beds were prepared for agriculture,and during this visit the team has to :

1- Level the soil of the wicking bed and determine lines for cultivation seeds and seedlings:

2- Cultivate corn on the sides and the surroundings of the wicking bed (to protect the plants from strong winds)

3- plant seedlings and seeds in rows to create diversity in the same wicking bed, were (flower, thyme, cabbage, onion) cultivated in the first wicking bed and (sage, thyme, flower, bean) were planted in the second wicking bed and so on.


The seeds of garlic or beans were planted between each four seedlings (diversity in the same wicking bed in addition to giving support to the rest of the plants):

- Garlic and onions: to fight disease
- Sage and thyme: insect repellent
- Beans: nitrogen fixation

4- Irrigate the surface of the wicking bed with water, cut a piece of burlap and cover the surface with it (to maintain soil moisture)





B- Digging the incomplete holes in the Swalle channel (1) : Hilti (Drilling mechanism) was used to break the hardpan inside the holes:

Complete the digging holes which contains a hardpan because it is difficult to dig with the shovel so the water can reach the trees and facilitate the extension of the roots.


C- Digging channel swalle (2) besides digging the holes inside the channel, then the canal was irrigated and the pits were filled with water to test the permeability and absorption of the soil for water

STAGE 4: Field Visit on 05/12/2019

A training workshop was implemented at Al Majidya village on Tuesday 17/12/2019 by The National Center for Agricultural Research through the Directorate of Economic and Social Studies and the presence of Dr. Masnat Al-Hyari- Director of Socio economic Research Direcotorate, Eng. Majdi Al-Adwan- Expert in Sustainable Agriculture, Economic and Social Studies Work Team: Eng. Malik Abu Rumman, Eng. Omama al-hadidi, Eng. Ola Arabiyat, Eng. Alaa Al-Abdullat, Eng.Tayseer al-adwan, Eng. Alaa Al-Awaida and technician Mr. Ali Madallah, within Water Harvesting Techniques and Empowering Rural Women and Sustainable Agriculture project which is implemented in cooperation between the National Center for Agricultural Research and the International Center for Agricultural Research in the Dry Areas (ICARDA).

Dr. Masnat Al Hiary welcomed the attendees and introduced the project and the activities (practical and theoretical) regarding the techniques of water harvesting and barley cultivation in addition to the steps for the cultivation of Wicking Beds and the implementation of the swales.

Dr. Masnat Al Hiary expressed her thanks and gratitude for the partnership and cooperation between the National Center for Agricultural Research and ICARDA, as well as for the partnership with the Arab Group for the Protection of Nature.

The attendees, consisting of the team of economic and social studies, a group of volunteers active in the field of social service and a group of farmers listened to the lecture given by Engineer Majdy Al-Adwan in the field of stages and steps for sustainable agriculture, including how to harvest rainwater, planting on lines using the lines of Contour farming, Cultivation in water using wet basins (Wicking Beds) as well as compost manufacturing.

Implemented Activities:

1- Ensure that the holes are prepared: the holes have been cleaned and their digging have been completed to prepare them for cultivation

2- Planting trees in the swale Canal and the interior of swale I (swales 1 + 2)

Explain the activities that have been implemented:

1- Ensure that the holes are ready:

The holes are cleaned and ready for planting: In cooperation with the volunteers, the holes were cleaned, and the digging of holes was completed to prepare them for planting

2- Planting trees in swale and swale Canal:

- The newspaper and straw were used by placing them under the hole before planting and as a mulch around the tree after planting:

Before planting: Newspaper and (or) straw are placed at the bottom of the hole before planting and moistened with water so that a source of moisture is close to the root of the tree at the beginning of planting.

After planting: Newspaper and (or) straw are placed after planting around the neck of the tree as a mulch to maintain moisture and protect the lower part of a tree from the sun's rays to reduce evaporation, (maintain moisture after irrigation).

The trees were planted along the swale Canal (1 + 2) and in the interior of swale I (1 + 2):
The trees (Albizia, olive, locust, figs) were planted in the swale canal (1 + 2) and the interior of swale (1 + 2).

The trees (Cactuses, locust) were planted around the wall of the farm as a buffer for strong winds, in addition to considering locust trees as fodder for the animals.

Volunteers participating in the implementation of the tree-planting activity (the Arab Group for the Protection of Nature):

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