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Project Acronym: ISFERALDA

Project title: Improving Soil FERtility in Arid and semi-arid regions using Local organic DAte palm residues

D4-4 Organic amendment production

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Summary

This deliverable describes the production of the compost by Palm Compost company, partner of ISFERALDA project in Algeria, and by the "Association de sauvegarde de l'oasis de Chenini" (ASOC), the association for the safeguard of the Chenini oasis in Tunisia.

1 Production of compost by Palm Compost in Algeria

1.1 Introduction

Palm Compost company have to produce the organic amendments used in the project for the Algerian partners. Once the best amendments have been selected, the objective of this company is to optimise and industrialise the production of the best amendments tested.

This deliverable describes the different steps of the production of the organic amendments.

1.2 Location of the palm composting company

The Palm Compost company is located 10 km east of the city of Biskra in the commune of Chetma (Figure 1) in an exclusively phoenicultural zone in a public investment area where several farmers have benefited from land concessions for their development. The coordinates are Latitude: 34°50'18.99"N, Longitude: 5°49'44.35"E.

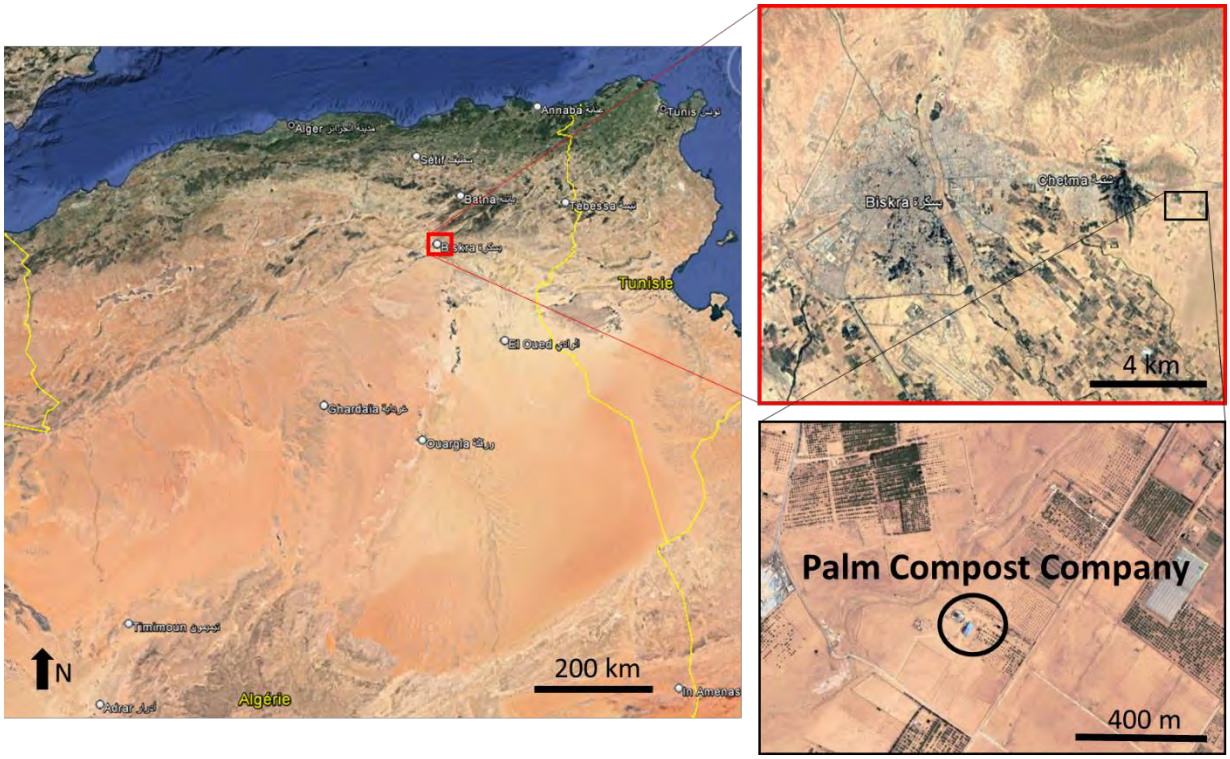

Figure 1: Location of Palm Compost in Algeria

This company has a plot of land of about 10 hectares. It consists of a storage area for dry palm of about 2000 m², a 750 m² cement platform with 4 composting platforms and a 450 m² compost processing shed (Figure 2)

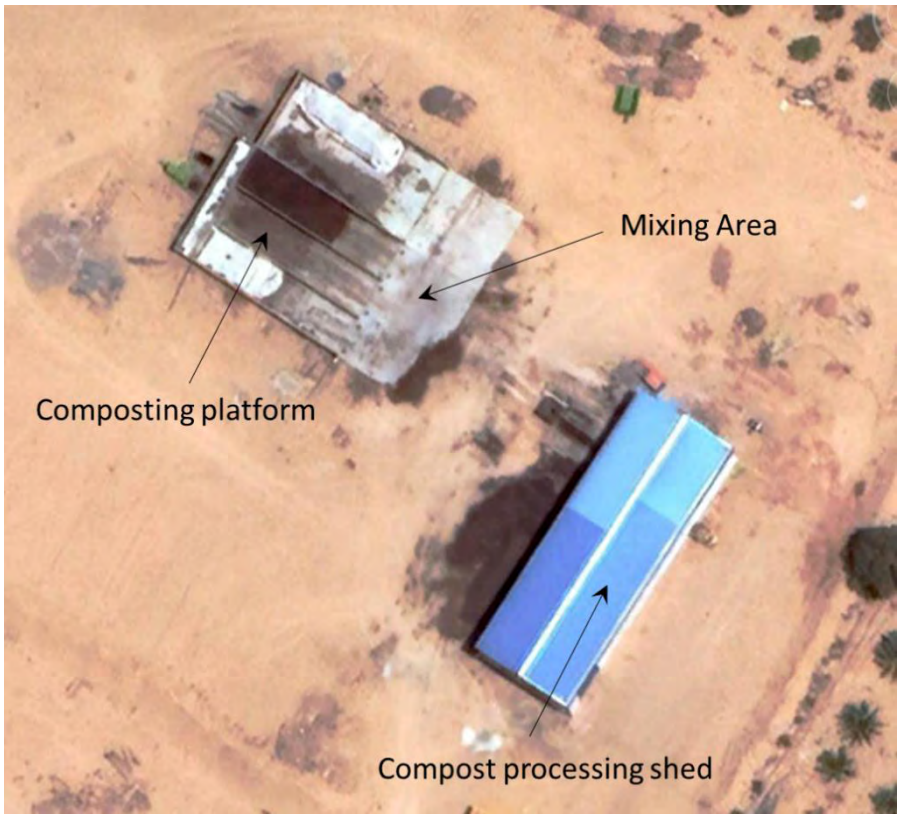

Figure 2: Aerial view of the site and location of the different structures

1.3 Compost production

1.3.1 Reception of dried date palms

The reception area for dry date palm palms consists of two different areas for storing the palm residues (Figure 3). The palms are sorted according to their size before crushing.

Figure 3: reception area for dry date palms

1.3.2 Crushing area

The crushing area covers a surface of 50m². The selected whole palms are finely crushed to 15mm (Figure 4, Figure 5).

Figure 4: Plant crusher

Figure 5: Crushed date palm

1.3.3 Composting platform

It is an uncovered area on a concrete platform of almost 800 m2 which consists of several dedicated spaces.

1.3.3.1 Mixing area

An area of 300 m2 is dedicated to the mixing of palm leaf shreds (palms and rachis bases) and cattle/cattle manure. The mixture is made from an equal volume of each compound without the addition of biological activators. The mixing of the shredded material with the manure is facilitated by the use of a homogeniser (Figure 6).

Figure 6: Homogeniser for crushed palm residues and manure

1.3.3.2 Compost platform

The device used is called stirred beds compost system.

The stirred bed system is a combination of controlled aeration and periodic turning methods. Composting takes place between walls that form long, narrow corridors called beds. In this case, they are called Composting platforms (Figure 7, Figure 8).

The turning operation is carried out by a loader that places the raw materials at the front end of the bed on the mixing platform. As the homogeniser turns the material (Figure 6), a loader moves the compost to a set distance using rotating blades or flails to stir the material, break up the clumps and maintain porosity. The whole area is then covered to accelerate the fermentation process. In the absence of biological activators, palm compost gets its product within 2 to 3 months.

On this platform, there are 4 different platforms. The largest platform (20 x 10 m) is for temporary storage of compost after maturation (Figure 7). The 3 other platforms are smaller with a surface of 100 m² (5 x 20 m) (Figure 8). They are used for the maturation phase of the compost. A ground aeration system using 20mm PVC barbicans allows for continuous aeration of the compost. The aeration shafts are regularly distributed in each platform. They are supplied by air generators installed in the control room behind the three platforms (Figure 9). The concrete floor with a slight slope towards the mixing area allows the compost tea to be collected in water troughs (Figure 10).

Figure 7: Largest composting platform

Figure 8: small composting platforms

Figure 9: Aeration system

Figure 10: water troughs collecting compost water

1.3.3.3 Electrical control room

Behind these three platforms is a covered control room measuring 3m x 15m with electrical panels, hydraulic pumps with timers and air blowers on the floor (Figure 9).

Water is supplied regularly through a system of nozzles installed on the walls of the beds.

Between compost turnings, aeration is provided by barbicans to aerate and cool the compost. As the materials along the bed are at different stages of composting, the bed is divided into different aeration zones. Several fans are used for each bed. Each fan supplies air to an area of the bed and is individually controlled by a temperature sensor and timer.

1.4 Compost processing shed

At the end of the composting process, the compost is transported by a loader on a conveyor belt from the large platform into the shed (Figure 11).

Figure 11: conveyor belt to the shed

The compost is then sieved to 8 mm, 6 mm and 4 mm (Figure 12). The larger particles will be recovered and re-composted. The finished product is then deposited in the shed to await packaging in 25 kg bags (Figure 13).

Figure 12: Sieving of compost

Figure 13: Compost bagging machine

2 Production of compost by the association for the safeguard of the Chenini oasis (ASOC) in Tunisia

2.1 Presentation of ASOC

The association for the safeguard of the Chenini oasis (ASOC) was created in 1995 and is located in Chenini, in the south-east of Tunisia in the governorate of Gabes. This town has an oasis of 165 ha which contributes to the food security and income of many families. However, in recent years, the oasis has been severely degraded by factors such as overexploitation of natural resources, pollution and urbanisation. In the face of these threats, ASOC aims to safeguard the oasis by mobilising the local population, identifying and understanding their concerns and ambitions, and helping to satisfy the population within the means available.

In particular, ASOC has carried out actions to clean up the oasis and motivated farmers to maintain their land. As a large amount of green waste was collected, a composting station was created to recycle this resource and contribute to the fight against the degradation of the oasis.

2.2 Compost production

2.2.1 First productions of compost

Initially, in order to achieve a viable composting activity, ASOC mobilised 40 local farmers to produce the compost themselves. Composting areas were then set up in the plots to accommodate a portable shredder and to mix the different components of the compost. For 4 years, the composting was carried out by the farmers on their own plots. Then, in order to contribute to the development of compost making, the production took place on the whole oasis. The ASOC was then able to acquire land and adequate machinery to launch the production of compost on a large scale.

2.2.2 Current compost production

First, the date palm leaves are air-dried (Figure 14). They are then crushed using a grinder. The residues are a few cm in size.

The crushed palms are then placed in a soaking tank with animal manure where they are fermented for 6 months. The manure serves as an activator for the composting process. The mixture of palms and manure has a proportion of 30% crushed palms and 70% manure.

After that, windrows are formed. They are regularly moistened and turned to maintain aerobic conditions.

When the compost is sufficiently mature, it is packed in bags.

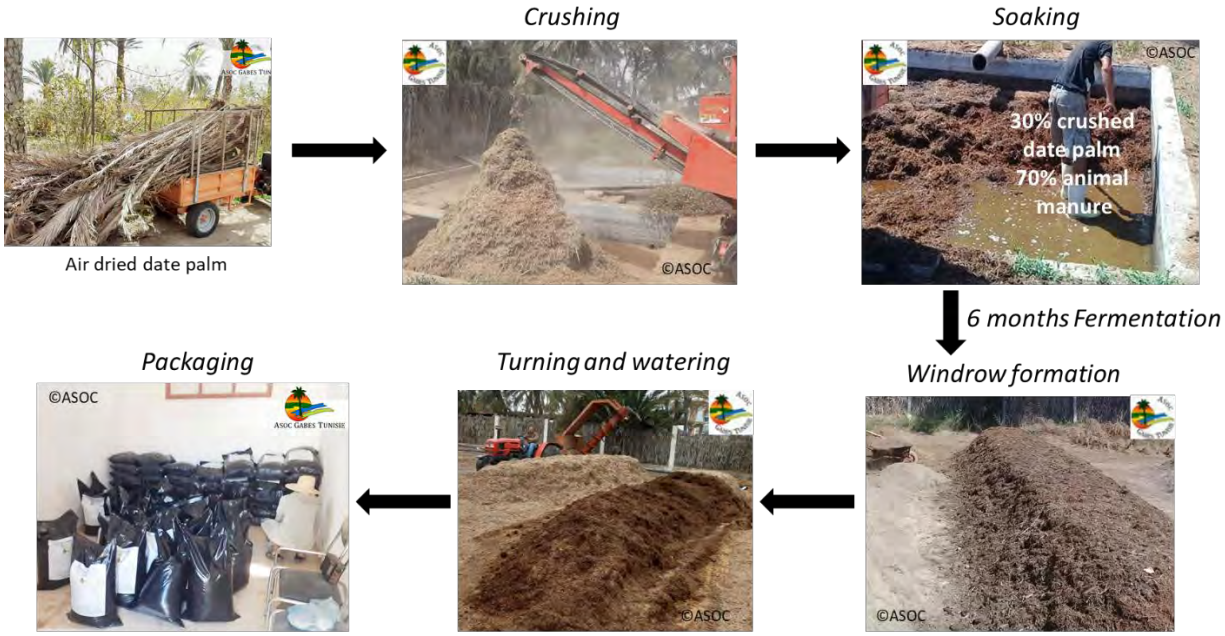

Figure 14: Compost production processes in ASOC, Tunisia

In 2018, the plant produced 150 tonnes of compost per year. The number of farmers involved has increased from 40 to 100 on an area of 85 ha, of which 53 ha is organic. In addition, the 40 farmers from the first phase of the project continue the cleaning process and the production of their own compost.

The installation of the composting station has made it possible, in addition to mobilising local farmers and encouraging them to clean up their agricultural plots, to improve the fertility of the soil with organic fertilisation.

2.2.3 Future compost improvement

This compost, which is distributed and marketed, must meet a good quality standard. Indeed, despite its various advantages, compost can be dangerous for the soil. Poor quality compost can pollute the soil or lead to an accumulation of pathogens.

In order to improve the quality of the compost produced and to monitor it throughout the manufacturing process, ASOC conducted scientific trials in collaboration with the Institut des Régions Arides de Médenine (IRA), the Institut Supérieur Biotechnologie Appliquée de Médénine (ISBAM) and the Olive Tree Institute (Hidri, 2022). The aim is to improve the technical characteristics (organic matter content, pH, electrical conductivity, etc.) and therefore its efficiency.

Bilbiographie

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HISTORY OF CHANGES		
Version	**Publication date**	**Change**
1.0	30/05/2022	▪ First version
1.1	01/07/2022	▪ Addition of the method to produce compost in Tunisia