MISSION REPORT

OUTLINE (TITLE)	**SWIM and Horizon 2020 SM**
Mission Purpose (Project Activity #)	**EFH-IL-2:Support on olive oil mills waste Regulation and methods (continued previous activity under H2020 CB/MEP program)** **Task 1: Mission of the experts to Israel for an on-site tour in Haifa and the Northern Districts; a multi-stakeholder meeting; a 2nd on-site tour and wrap-up.**
Number of days worked:	9 days for both experts: Kostas Chartzoulakis and Georgios Kontaxakis The working days of a 3rd expert Paris Fokaides that came on the mission were offered
Period: From: **To:**	K. Chartzoulakis: 4 Nov: travel to Israel; 5,6,7 Nov: mission, 8 Nov: travel G. Kontaxakis: 5 Nov: travel to Israel; 6,7 Nov: mission, 8 Nov: travel
Organisations visited:	Many (see within the report)

Sunday 05/11/2017,

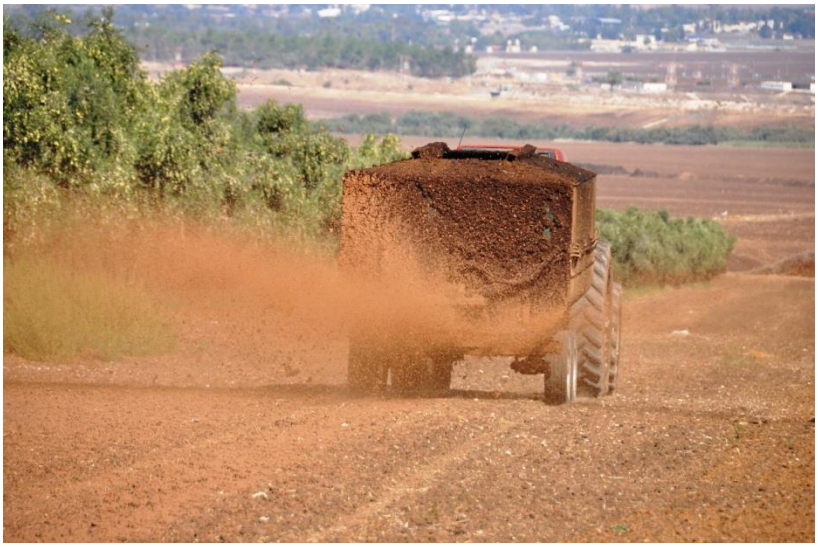
Two phase Olive Mill at Hayogev (07.30-10.30 am.)

This olive mill is in an agricultural area. The olive mill has nearby ‘’open fields", suitable for land spreading. The land belongs to a "kibutz". The processing capacity of the olive mill is 12.5 tonnes of olives per hour, and it is the biggest in Israel. The olive mill produces 1300 tonnes of olive oil per year. The personnel of the mill are 4-6 employees and it is a family business.

This olive mill exploits state of the art technology for olive oil production. In order to maintain the polyphenols in the end product, the olive mill owner refrains to wash olives prior to crushing. The process was demonstrated in the following stages:

1. Reception of olives. The olives are received in a special pit and they are then transferred with belts to the crasher. Prior to their insertion to the crasher, the olives are cleaned from solids with a ventilator in a two stage procedure. Washing is also available in the tunnel, but it is optional, and only used according to the condition of the olives.
2. Following the cleaning the olives are weighted and de-stoned. The olive pulp is then crushed and is ready for malaxation. The stones are stored in special silos and used for heating.
3. The paste is then fed into the two phase decanter. Olive oil is extracted, weighted and stored into stainless steel tanks (right way to avoid deterioration) or plastic tanks (wrong way because it can contaminate the oil). The moistured pomace is stored in another tank, ready for land speading.
4. The by-product (pomace with moisture content > 65%) is spread into the open fields using a special tank pulled by a tractor.

The olive mill was not fulfilling the EU regulations for quality and safety.

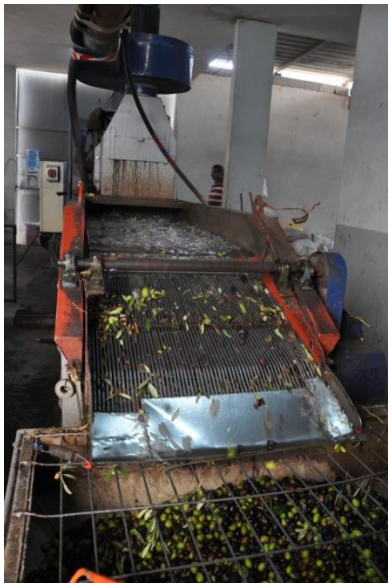


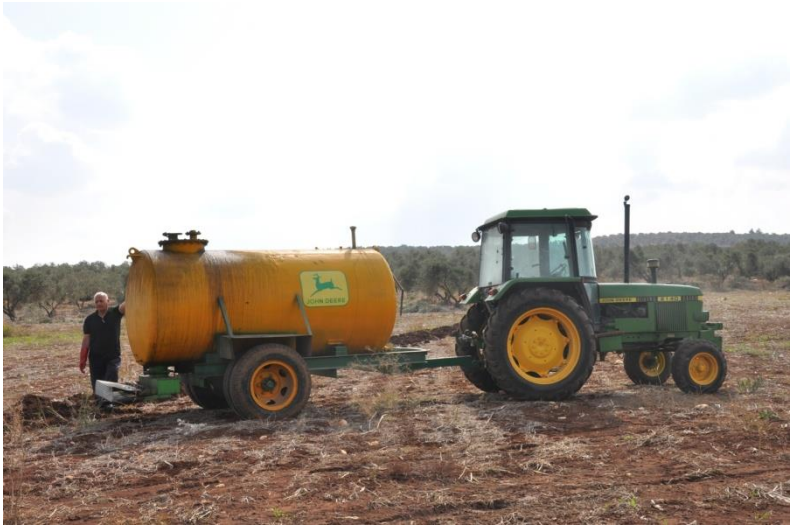
Three-phase Olive Mill in Kfar-Manda (11.30 am -12.30 pm)

The olive mill in Kfar Manda was a three-phase olive mill located inside a village, equipped with a tractor and a land-spreading. The capacity of the olive mill is 3 tonnes of olives per hour, using two three-phase decanters. The olive mill produces 45 tonnes of olive oil per year. The olives were brought in the olive mill within plastic bags, not allowing the aeration of the fruits. This practice usually speed-up fermentation leading in olive oil deterioration. The personnel of the mill is 3-4 employees and it is a family business.

Although the legislation in Israel requires a storage of olive mill waste water of three days, this olive mill has a storage of 25 m³, which according to the production of the olive mill is sufficient for 1 ½ day (around 20 m³ per day). The owner though possesses a tractor and a container of 6 m³ volume, and spreads the liquid waste in nearby fields. This procedure was demonstrated during our visit at the olive mill. The spreading of olive mill water is limited to 80 m³ per hectare. The solid residue (pomace) is used by the farmers for animal feeding.

Also this olive mill was not fulfilling the EU regulations for quality and safety.

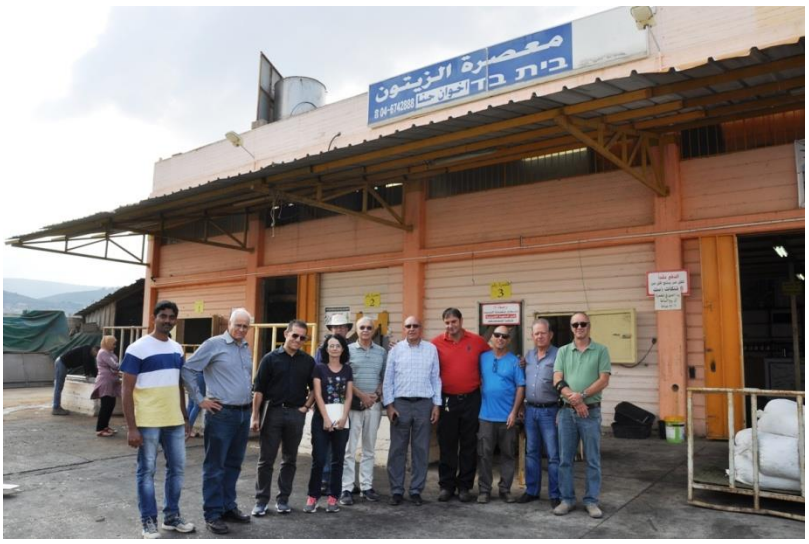


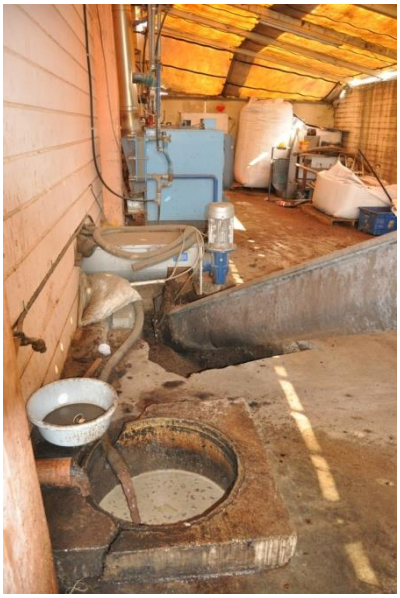


Three-phase Olive Mill in Sachnin (13.30 am -14.00 pm)

The olive mill in Sachnin is located in an industrial area. The olive mill has a processing capacity of 7.5 tonnes of olives per hour (3 x 2½ tonnes decanters). The olive mill has the capacity of storing 85 m³ of olive mill waste water. The olive mill produces around 75 tonnes of oil per year and it operates around 4-5 weeks per year, depending on the yield. The personnel of the mill is 4-6 employees and it is a family business

The solid waste of the olive mill is used as animal feed. The OMW produced by the olive mill is spread to open fields during the time of production, without any processing. The cost of spreading is paid by the government and water authority (2/3, about 30 shekels), if money is available and 1/3 by the olive mill (15 Shekel).



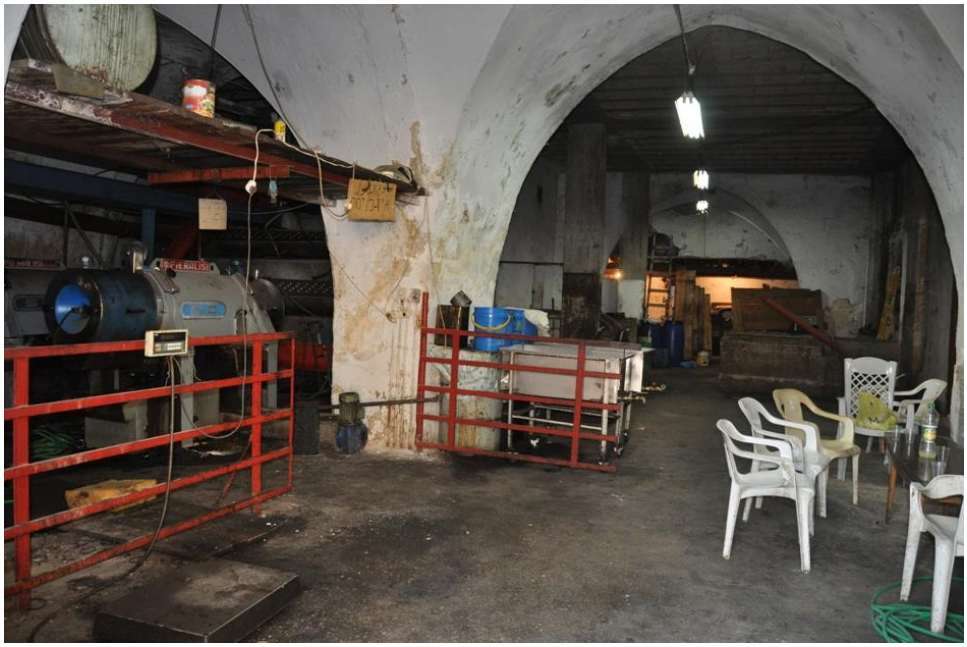


Field in Rama village (14.30 am -14.45 pm)

A brief visit was also made to a field in Rama village, to see a truck spreading olive mill wastewater to an open field. The truck was equipped with an automatic valve to regulate the time at which the waste water was spread. The waste water was not spread near a well, which was situated in the field.

Three phase olive mill in Rama village (15.00 am -15.30 pm)

The three phase olive mill visited in Rama village is the sole olive mill in Israel which does not have a storage tank for its liquid waste and disposes the olive mill wastewater into the sewage system of the area. The reason for not having a storage tank has to do with the fact that the olive mill is located in the centre of a densely populated village, and there is no way for a truck to collect the olive mill waste water.



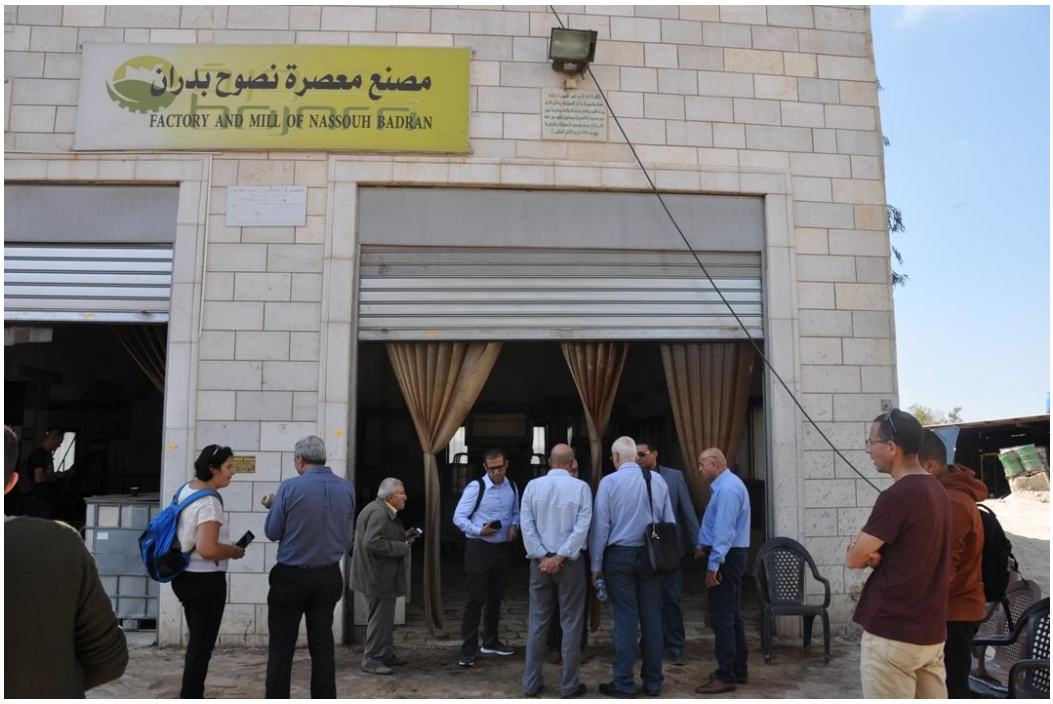
Monday, 06/11/2017

Three phase olive mill in Tulkarem village – Palestine Authority (08.30 am -12.30 pm)

The olive mill in Tulkarem is a three phase one, which claims that it has developed an innovative technique for processing its olive mill wastewater. In general, in the territories under the Palestinian Authority there are no regulations concerning the disposal of olive mill waste water, resulting to its disposal in the sewage system. The visited olive mill has developed a natural multi-stage procedure to deteriorate polyphenols in olive mill waste water, in order to make it suitable for usage as a liquid fertilizer.

The presentation in the olive mill concerned the performance of the produced liquid fertilizer. However, no analysis and description of the end-product was presented, although the owner of the mill claimed that the content of the polyphenols was significantly reduced, without the loss of any other nutrients, required for the soil. Satisfactory results of cultivations with the use of the produced fertilizer were also presented.

The olive mill owners did not reveal the exact procedure for producing the end product, whereas it was assumed that this was achieved through a combination of physical and chemical processes including the addition of manure to increase the nutrients of the fertilizer in a later stage, and the usage of some herbs in a former stage to deteriorate the concentration of polyphenols. The owners seem willing to receive scientific and financial support to establish their product in the olive mill market in the Palestinian territory and abroad.



Tuesday, 07/11/2017, 09.00 am – 15.30 pm

Consultation Workshop at the Ministry of Environmental Protection in Tel Aviv on OMW Management

The programme of the workshop was the following:

9:10 – Opening words – Alon Zask – Senior deputy director general for natural resources, Ministry of Environmental Protection.

9:30 - OMW treatment in Israel, past, present and future. By Touma Aboud – Agro-ecology Department, Ministry of Environmental Protection.

10:30 - Alternative technologies for OMW management with emphasis on soil application, by Dr. Kostas Chartzoulakis, Olive Tree Institute, SWIM-H2020 SM NK Expert from Greece

11.30 - Waste to Energy Exploitation of Olive Mills Waste Streams by Dr. Paris Fokaides, Frederick University, invited expert from Cyprus

12.00 - Funding instruments from E.U. co-financed programs regarding OMW management, by Georgios Kontaxakis, agro-economist, expert from Greece.

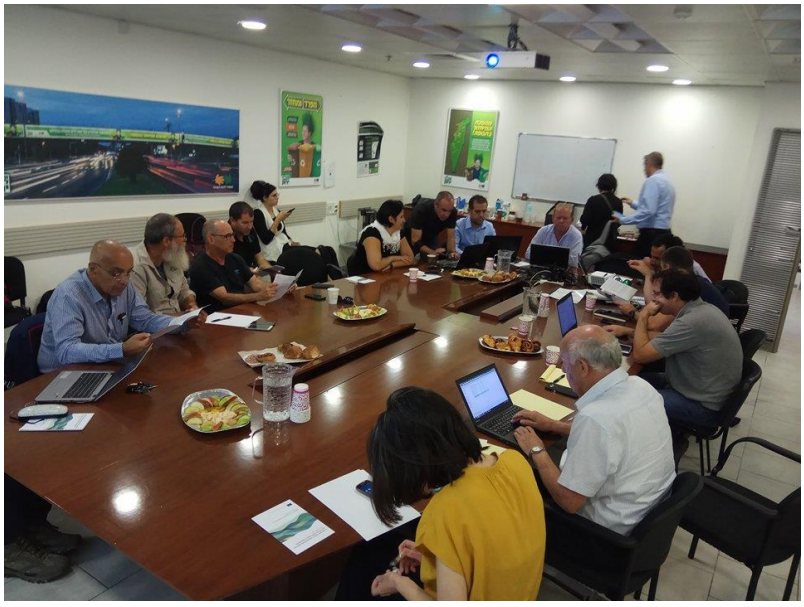
12:30 Lunch

13:00- Composting of OMW pre-absorbed by green waste in polyethylene sleeves with forced aeration by Yael Laor – Volcani Agriculture Research Center, Israel

:1330 - Five-year applications of OMW to an intensive olive orchard: effects on selected soil physical properties, crop and soil nutritional status, by Arnon Dag – Volcani Agriculture Research Center, Israel

14:00 - Anaerobic treatment of OMW – a worked pilot – Uri Marchaim, Migal Research Center

14:30 - Open discussion



Key Issues Discussed at the Consultation Workshop	The different OMW management practices applied in Israel during the last 20 years were presented and discussed by Israeli participants. Such practices include: land spreading of OMW on «open fields» or agricultural roads, discharge in sewage, evaporation ponds, DAF systems on Cabri & ziv aquifer Oms to achieve at least 70% reduction of pollution load, and integrated management for energy production. The experts from Greece and Cyprus presented the different OMW management alternatives licensed and working in EU countries and highlighted the funding opportunities for implementing management practices. More interest was shown and attention was given on controlled application on olive orchards, the regulations and precautions and integrated management for biogas and energy production. The legislation and regulations existing in Israel, Greece and Cyprus were discussed and ways to be implemented at olive mill level.
Outputs	**Taking into account the existing situation, as it appeared during the visits in different olive mills and the possible OMW management technologies, that can be applied under current conditions, the main outputs of the workshop are:** **a) Continuing with controlled land application (to open fields and olive orchards) of OMW, as the most cost-effective and environmentally acceptable management. For orchard application a soil analysis is necessary for determining the amount of OMW to be applied each time, under the certain conditions. The OMW application must be depended on water and wastewater corporations (subsidies) mainly with contribution of OM owners (25-50%).** **The Mobile Integrated Sustainable System for OMW treatment serving the mills at their location, after some improvements (reduction of retention time, etc) can be an alternative.** **b) The establishment of a pomace processing plant in Israel will accept most of pomace for further processing will reduce environmental impact and produce of new products, like refined oil, pellets, etc.** **c) In long-term the number of olive mills must be reduced in order to be able to afford the cost for safety and quality standards, as well as the cost of management of their by-products. A re-location of OM out of the towns or villages is a must together with shifting from 3phase to 2phase decanters.** **d) Due to short time of operation of olive mills in Israel and the small quantity of OMWs produced, the OMWs should be integrated with other agriculture wastes produced during the year.** **e) The sustainable environmental and cost-effective treatment for all the organic agricultural wastes including OM wastes should be based on energy production though centralized or decentralized anaerobic treatment/biogas producing centers and then giving back the nutrients to the land (Bio-gas equivalent processes).** **f) An awareness campaign for proper olive mill operation and by-product valorization must be established.**

Difficulties Encountered or Other Comments	Since there is no environmentally acceptable management at no cost, the olive mill owners must be informed and prepared to invest in the appropriate available technologies to fulfill the requirements of the legislation.

Name	Date	Signatures
Kostas Chartzoulakis and Georgios Kontaxakis	10/11/2017