



AgroStrat

Sustainable Strategies for the improvement of seriously degraded agricultural areas:
The example of *Pistachia vera* L.

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7th Newsletter



Pilot field-Aegina island



Pilot field-Kilkis, North Greece



Pilot field-Aegina island

The three pilot fields in Greece

Implementation of sustainable cultivation and waste management practices

Three pilot fields were selected in Greece. The two fields are located in Aegina island and the third one in Kilkis, North Greece. The pistachio farmers cooperate with the consortium and implement cultivation and waste management practices, as these were derived from project results. Soil, waste and water samplings take place every two months.

Cultivation Practices

The farmers use the Cultivation Management Software to receive consultancy on fertilization and the Central Management and Monitoring Tool to communicate results to the managerial center of the project.

Waste Management Practices

Two field constructions were established in Aegina Island. The farmers separate waste streams into solid waste and wastewater. The solid part is composted while wastewater is left to evaporate. Experiments are conducted to assess potential of using wastewater for irrigation after appropriate dilution.



Management of pistachio waste at field level



Simple low cost waste management systems were developed by Dr. M. Doula and Prof. K. Komnitsas and implemented at the two pilot fields in Aegina. The first one by constructing three shallow evaporation ponds and the second one by building four sequential collection reservoirs. The systems aim to assist separation of pistachio waste into solid waste and wastewater at field level. The proposed management scheme is a zero-waste approach and fully protects soils and water resources in the study areas.



Shallow evaporation ponds

Wastes are separated into solid and wastewater immediately after their production by using a simple separation equipment. The solid part is composted while wastewater is collected into three shallow ponds and left to evaporate. The ponds were constructed in one of the pilot fields and can be permanent or temporary. Protective media (geotextiles) were used to protect soil from leachates infiltration.

For the case of the sequential system, wastes are not separated after production. Instead, they are collected into the five reservoirs. The solid part is left to precipitate and then used for composting. Wastewater is left to evaporate

Sequential Collection Reservoirs

The system was constructed in Aegina island by exploiting a former, almost destroyed, pig breeding area.



The five stall places were reconstructed to form a sequential system of five reservoirs for waste collection.



Composting Pistachio Waste

Step by Step

Feedstock

- 10 parts of solid pistachio waste (after dehulling)
- 5 parts of well-digested manure
- 1 part straw
- 1 part clinoptilolite (natural zeolite, can be found in market)



1/ Apply the materials in layers, one above the other, alternately, and prepare a pile or a windrow



2/ Repeat the procedure and add more layers of materials

3/ Good mixing and wetting

4/ Protect the mixture using composting textiles



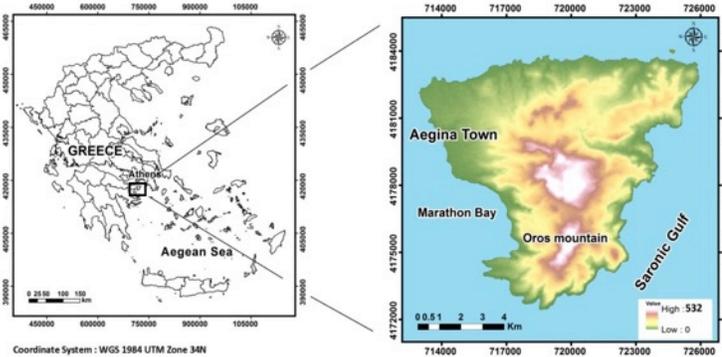
WINDROW TURNING FREQUENCY
 First 3-5 days Turn daily
 Next 3-4 weeks Turn 1-3 times/week
 Week 5 to End Turn once/week (max)

During composting

- Aerate the mixture often by turning (for 2-3 months)
- Keep mixture temperature below 65°C and moisture between 45 and 60%. Wet the mixture periodically
- Frequent temperature and moisture monitoring
- During maturity phase (the last 2 months) the compost must be kept at a protected area

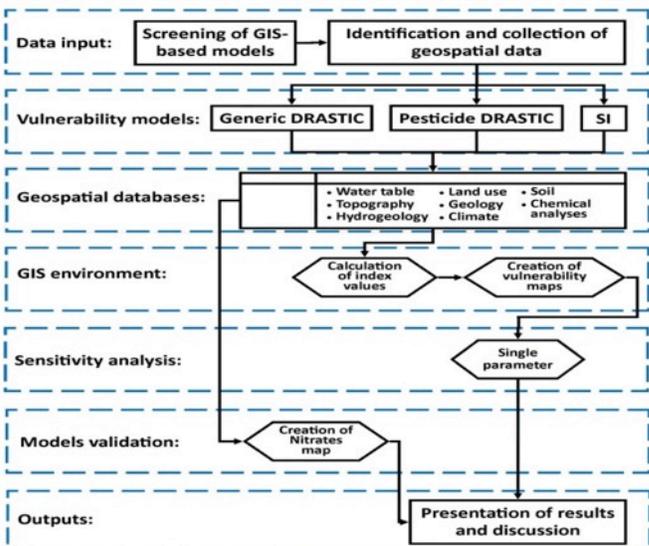
Technical University of Crete (TUC)

Risk assessment of groundwater vulnerability to contamination in Aegina

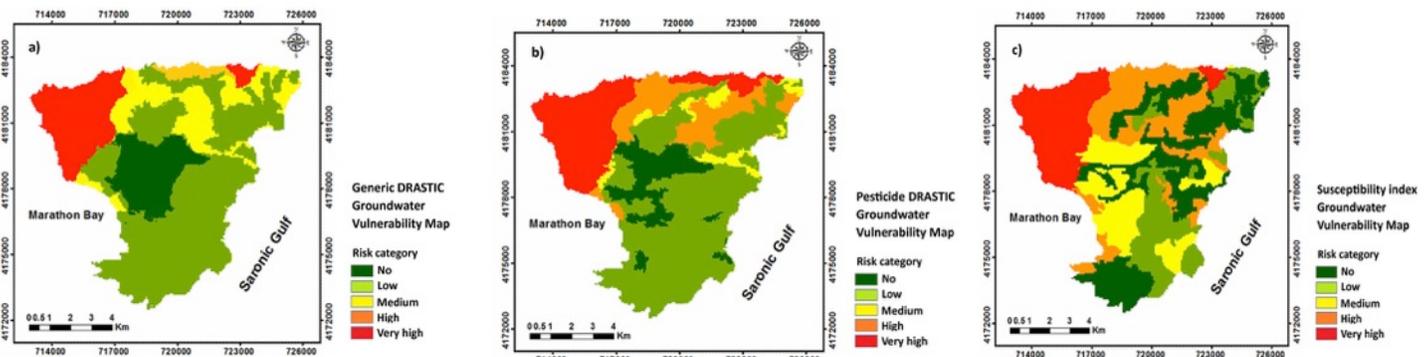


TUC carried out a Risk Assessment study in order to estimate groundwater vulnerability to contamination in the island of Aegina, Greece, using three well-established models (Generic DRASTIC, Pesticide DRASTIC and SI) suitable for shallow coastal aquifer systems and agricultural areas. Sensitivity analysis and validation of models were also carried out to evaluate, compare and validate the obtained results in terms of subjectivity and variation of parameters.

Several data collection techniques and procedures were employed in the study to obtain the accuracy required for the specific requirements of the three GIS-based models used. These included primary data obtained from in-situ measurements carried out in the frame of the AgroStrat project in order to assess water and soil quality in the study area as well as secondary data concerning geospatial (mainly land use and topography) and hydrogeological features, which were obtained from the literature, national agencies and local authorities.



Overall, similarities were found across the obtained mapping results of the three GIS-based models used, including areas that are characterized by “high to “very high” risk mainly located in the northwest part of the island; these areas are mainly covered by permeable “Poros” limestones and alluvial deposits. Categorised areas with very high risk were almost identical for both the Generic DRASTIC and SI models and occupied 17.99% and 18.29% of the island, respectively. On the contrary, larger areas (22.51%) characterized by “very high” risk for groundwater contamination, were identified after the application of the Pesticide DRASTIC model.



Based on the risk assessment results, it is clearly demonstrated that the overall groundwater vulnerability in the study area increases from south to north, and corresponds well with the increasing clay content in soil and the decreasing slope of topography and impact of vadose zone along the same direction.

AgroStrat with Farmers

The coordinator and Dr. G. Bartzas (TUC) visited Fthiotida prefecture between 27 and 30 September and cooperated with the two pistachio producers' Associations of the area, i.e. Association of Pistachio Producers of Makri and Association of Pistachio Producers of Molos-Thermopyles. The coordinator assisted the agronomists of the associations in using the [Cultivation Management Software](#) and the [Central Monitoring and Management Tool](#).

The coordinator discussed also with the two presidents of the Associations, Mr. G. Chondropoulos and Mr. S. Gallis for the implementation of AgroStrat results and achievements for the benefit of local pistachio producers.

Dr. M. Doula visited also the premises of STEVIA HELLAS and discussed with the CEO of the Cooperative, Mr. Ch. Stamatis regarding the conformation of the Decision Support Tools of AgroStrat to the specific needs of Stevia producers.

Fthiotida, Central Greece Meetings with two pistachio producers' Associations



AgroStrat with pistachio producers in Megara, Attiki



Dr. M. Doula, Dr. S. Theocharopoulos and Dr. Y. Trogianos with pistachio producers in Megara, Attiki

The Workshop in Cyprus, 25 June 2016



Dr. S. Theocharopoulos Dr. M. Doula
Prof. K. Komnitsas, Prof. N. Tzortzakis

AgroStrat participated in the "4th International Conference on Sustainable Solid Waste Management" which was held in Limassol, Cyprus, 23-25 June 2016. A session dedicated to AgroStrat and the management of agricultural waste was hosted by the Conference.

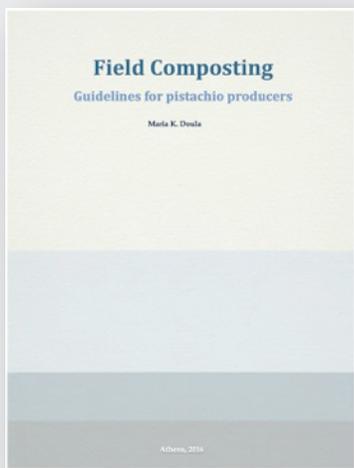


Publications-Participation in Conferences

4th International Conference on Sustainable Solid Waste Management



- *Monitoring agricultural waste disposal by local and regional authorities*
M.K. Doula, N.S. Papadopoulos, A. Hliaoutakis, A. Kydonakis, L. Argyriou, A. Sarris
- *LIFE-Agrostrat-What new brings to Mediterranean Agricultural Environment*
M. K. Doula, A. Sarris, K. Komnitsas
- *The environmental footprint of pistachio production in Aegina island, Greece*
K. Komnitsas, G. Bartzas
- *Life cycle analysis of pistachio production in Greece*
G. Bartzas, D. Zaharaki, K. Komnitsas
- *Evaluation of groundwater vulnerability in Aegina island, Greece, using GIS-based methods*
G. Bartzas, D. Zaharaki, K. Komnitsas
- *Web GIS-based application for agricultural areas management – the case of pistachio cultivation*
Hliaoutakis, N. Papadopoulos, A. Kydonakis, L. Argyriou, M.K. Doula, A. Sarris
- *Development and implementation of GIS Land Information Systems for waste reuse on soil*
S. Theocharopoulos, V. Kavvadias, K. Komnitsas



Field Composting-Guidelines for pistachio producers
Maria K. Doula

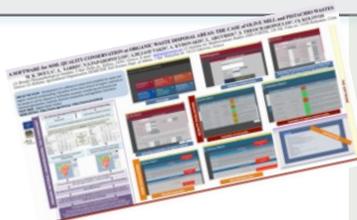
Building a Strategy for soil protection at local and regional scale-the case of agricultural wastes landsprading.

Doula, M.K., Sarris, A., Hliaoutakis, A., Kydonakis, A., Papadopoulos, N.S., Argyriou, L. (2016). Environmental Monitoring and Assessment, 188 (3), 1-14.



“Comparative life cycle assessment of three water intensive tree cropping systems”

K. Komnitsas, G. Bartzas, D. Zaharaki, D. Vamvuka
PREXIII 2016 - 13th International Conference on Protection and Restoration of the Environment,
3-6 Julv. Mvkonos island. Greece



“A software for soil quality conservation at organic waste disposal areas: the case of olive mill and pistachio waste”

M.K. Doula, A. Sarris, N.S., Papadopoulos, A., Hliaoutakis, A., Kydonakis, L., Argyriou, S., Theocharopoulos, Ch., Kolovos.
European Geoscience Union-EGU General Assembly,
17-22 April, 2016, Vienna. Vol. 18, EGU2016-5092-1

“How to evaluate the suitability of organic amendments for soil landsprading in relation to legislation and soil properties”

M.K., Doula, K., Elaiopoulos, A., Zorpas, P., Kouloumpis
SER 2016, Best Practice in Restoration, the 10th European Conference on ecological restoration,
August 22-26, 2016, Freising, Germany, p. 217.

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