

LIFE-Agrostrat-What new brings to Mediterranean Agricultural Environment

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The LIFE11 ENV/GR/951 project entitled “Sustainable strategies for the improvement of seriously degraded agricultural areas-The example of *Pistachia vera* L. (AgroStrat)”, <http://www.agrostrat.gr/>, focuses on the development of sustainable cultivation practices for intensively cultivated Mediterranean areas, which are under desertification risk, using as example the cultivation of *P. vera* L.

In general, AgroStrat develops its activities based on the principles of the Soil Thematic Strategy and all its deliverables consider soil, cultivated crops, environment and farmers as an integral system whose components are interrelated. The project clearly contributes to the fulfillment of the EU policy while at the same time proposes recommendations and guidelines related to treatment and reuse of pistachio wastes in the agricultural sector, a type of waste that has been studied only in a limited extent so far, especially by European scientists, although it poses significant threats to areas where *P. vera* L. is cultivated.

Through its actions, the project developed strategies, practices and decision-making tools that can be applied to and used for pistachio orchards in Greece, but with the potential to be extended to other crops and intensively cultivated areas under Mediterranean climatic conditions. AgroStrat demonstrated also how local communities (farmers and authorities) can cooperate and work together with scientists to develop and promote sustainable integrated management of resources and wastes, to monitor the effectiveness of their actions continuously and at the same time ensure and combine environment protection and increase productivity. The methodology to meet all these objectives includes:

1. Development of a set of soil indicators, appropriate for pistachio cultivation practices and wastes disposal that can be used for the evaluation of soil quality as well as degradation and desertification risk.
2. Exploitation of pistachio wastes to produce high quality compost. A methodology for composting pistachio wastes with the use of the natural zeolite (clinoptilolite) was developed, tested and demonstrated.
3. Development of a GIS-based Land Information System (GIS-LIS) and land suitability maps that allow evaluation of land properties in terms of suitability for solid waste and wastewater disposal or reuse for agricultural purposes.
4. Development of decision-making tools (a software and a web GIS-based application) that can be used by individuals (farmers, landowners) and authorities or associations. The tools provide features for soil, water and waste data evaluation as well as the potential for network establishment between farmers and authorities/associations through which, farmers can send their soil/water/waste data and receive consultancy for their cultivation from the scientists of the authority/association. On the other hand, authorities and associations have the opportunity to screen cultivated areas rapidly, identify

potential risky conditions and proceed to detailed monitoring, if necessary, and implement resources monitoring at field and municipal/regional scale allowing, thus, continuous monitoring of the cultivated areas.

5. Evaluation of groundwater vulnerability in sensitive areas such as islands, where the availability of groundwater resources is limited and often of poor quality. This is accomplished through a GIS-based methodological approach, considering three different models, namely the Generic DRASTIC, the Pesticide DRASTIC and the Susceptibility index (SI). The methodology adopted in Agrostrat can be used as a decision support tool to indicate which preventive or remedial measures need to be taken by local and regional authorities as well as by policy makers, in order to minimize the cost of groundwater monitoring and consequently improve groundwater quality and agricultural sustainability.
6. Assessment of the energy use footprint and the associated environmental impacts of pistachio (*Pistachia vera* L.) cultivation in Aegina island, through a holistic cradle-to-farm-gate Life Cycle Analysis (LCA). The main impact categories assessed were acidification potential (AP), eutrophication potential (EP), global warming potential (GWP), ozone depletion potential (ODP), photochemical ozone creation potential (POCP) and cumulative energy demand (CED). In order to reveal the main environmental concerns pertinent to pistachio production and propose measures for the reduction of environmental and energetic impacts, three scenarios were compared, namely the baseline scenario (BL) that involves current cultivation practices, the green energy (GE) scenario that involves the use of biological fertilizers i.e. compost, and the waste utilization (WU) scenario that involves the production of biochar from pistachio and other agricultural wastes and its subsequent soil application to promote carbon sequestration (CS) and improve soil quality.

All the above are included in an *Integrated Management System* that will be delivered to the European Commission and to national authorities aiming to ensure improvement of agricultural environmental quality as well as of farmers' income and quality of life.

Agrostrat is anticipated to bring clear environmental benefits since it proposes sustainable solutions for cultivation, resources and waste management. Moreover, the continuous monitoring of cultivated areas, which is feasible by adopting and implementing the two decision-making tools by associations, authorities and governmental agencies, includes also economic benefits at local and regional level through reduction of monitoring costs by considering farmers as key actors and data carriers, who periodically update local and regional data bases, and also through early identification and solving of potential problems.