

# THE AGRO-ECOLOGICAL SYSTEM OF *ENARENADOS* IN LANZAROTE, CANARY ISLANDS, SPAIN

On the Island of Lanzarote (Canary Islands Region, Spain), the traditional agro-ecological system of *enarenados* continues to be adopted to cope with the aridity of the soils.

With rainfall of just over 125 mm per year, the island is characterized as an arid area and the presence of recent volcanoes offered the inhabitants an ecological solution, taking advantage of the volcanic ash that covers the pre-existing vegetal soil to conserve subsoil moisture and develop their traditional crops.

[On the website of the Tenerife Museum of Nature and Archeology](#), a divulgation article provides extensive information about this organic farming system that can be used in other territories with similar characteristics.

In areas near volcanoes, the system of *enarenados* is settled on floors covered with lapilli (picón, rofe), volcanic ash whose purpose is to conserve the moisture of the subsoil. The method is cleaning the soil from stones to be able to cultivate and placing on it a layer of rofe of 10 to 15 centimeters. The soil can maintain moisture even twelve months after the last rains, obtaining agricultural yields comparable to those of irrigation, with rainfall of just over 125 mm per year. The predominant crops are vineyards and certain gardeners such as onion, watermelon, sweet potatoes, potatoes, legumes, millet, and lentils.

The large porosity of the *rofe* and its hygroscopic nature allow it to retain the humidity of the medium through small holes inside the rock grains that facilitate the passage of condensed or precipitated water at night, helping to alleviate the lack of water in arid areas with low precipitation throughout the year. At the same time, the *rofe* prevents evaporation, since this layer of small rocks isolates the soil from the environment, preventing moisture from escaping by evaporation into the atmosphere.

In addition, the *rofe* facilitates the geological effect called *mulching*, which consists in the layer acting as an insulating mattress for the temperature and humidity of the soil. Being capable during the day of capturing solar radiation and raising the temperature of the soil, however, at night it does not lose the terrestrial atmospheric radiation and thus the soil remains at a temperature always above the environmental one. Furthermore, the water content of the soil remains constant. Another advantage of the *enarenado* system is to protect the



soil from both wind erosion and heavy rains by allowing rainwater to infiltrate, preventing runoff.

The other technique that characterizes Lanzarote's agro-ecological system consists of cultivating in wells dug in the ground. These *enarenados* allow to grow crops characterized by a deep root system, such as the vine, the fig tree and other fruit trees. The preparation of the cultivation land consists of the opening of holes 1.25 - 2 meters deep, until reaching the paleosol. At the bottom of the holes are planted vines or fruit trees. A hectare of sanding can accommodate between 250 and 300 plants.

The holes are protected with small dry-stone walls that are located perpendicular to the direction of the prevailing winds. The soil where the roots thrive remains moist under a remarkable layer of rofe after a long period without precipitation. In this way it has been possible to cultivate in a very xerophilic environment, with strong evaporation and high insolation, these crops being located in the most arid part of the island. In addition to favoring the local economy, these inverted cones form unique and spectacular landscapes, such as those of the Geria Valley, known and visited for their beauty.

The variety of crops in the agro-system has been built over time by the farmers of Lanzarote, adapting the technologies and the seeds to the extremely arid climate. Some crops such as watermelon and melon, for example, have tropical origins, they are very thermophilic and absorb moisture. Some varieties of potatoes and a variety of low-bearing millet were also adapted to the island climate.

Among the agricultural technologies created by the farmers of Lanzarote to cultivate in arid climate there is also the use of the Jables, marine sands of organic origin that circulate constantly transported by the wind. Jables have the same virtues as volcanic sand, which allow them to cover clay soils to conserve and condense moisture. They are used for the cultivation of various products: sweet potatoes, pumpkins, melons, tomatoes, watermelons, potatoes and other water-demanding vegetables in a dry land regime. The cultivation plots are fenced in with bards, usually made from rye straw, fixed in the ground and used to protect the plantations from the wind.

In 1993, [the Island of Lanzarote was declared by UNESCO as a World Biosphere Reserve](#) for its high level of biodiversity, for the capacity of the island culture to develop a series of adaptations to catch and use the scarce and unpredictable rain and for its agricultural techniques for sowing under ash and volcanic sheet flows under inverted cones forming unique landscapes.

[An article published in 2016 in researchgate.net](#) by researchers and professors from the University of La Laguna of the Canary Islands, shows that the agricultural system of sandblasting has left an important heritage, with an environmental and landscape value that has played a relevant role in the regional development.

The farming system of *enarenados* lies in the work and wisdom of the Lanzarote farmers. Today, within the framework of the new tendencies to recover and promote agro-ecological systems adapted to the specific



characteristics of the territories, respecting nature and reducing the use of external inputs, it represents an example of great international relevance.

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