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Case Study

Responsible Agriculture



Case Study– Casas de Hitos

Sustainable Development Goals and the Olive Oil Industry

The agri-food sector is one of the sectors that can contribute the most to the fulfilment of the SDGs in various areas (Mozas, 2019). In this regard, the strategic importance of the olive oil industry means that it faces challenges whose fulfilment will substantially influence socio-economic development and the preservation of the environment. The incorporation of the SDGs in this industry implies a shift from systems focused almost exclusively on production and distribution, to new paradigms involving environmental, nutritional, and ethical goals (Petruzzella et al. 2020). The SDGs are presented as a vital opportunity to do business, promote corporate responsibility, and develop initiatives for sustained growth and equality (Preston and Scott, 2015; Parrilla & Ortega, 2022).

Consumption and benefits of olive oil

Domestic consumption of olive oil in the world, in the 2021/2022 campaign, has been more than 3 million tons (Statista, 2022). However, palm oil remains the most widely used with about 74 million tonnes consumed, followed by soybean oil with a global consumption of more than 60 million tonnes. Rapeseed and sunflower also have a significant share, with some 28 and 20 million tonnes consumed respectively.

However, Spain stands out for being a country where 60% of the vegetable fats consumed correspond to olive oil, followed by 33% corresponding to the consumption of sunflower oil, and practically the non-existent 7% of the consumption of other vegetable oils (ANIERAC, 2022).

Virgin olive oil is a staple of the Mediterranean diet and is beneficial to health. Research has shown that the Mediterranean diet reduces the risk of mortality in general and in particular mortality associated with cardiovascular disease, cancer, Parkinson's and Alzheimer's (Sofi et al., 2008). Olive oil is a staple of the so-called Mediterranean diet, standing out for its high content of phenolic compounds and its potential health benefits (Boronat et al., 2018).

History of Olive Oil Cultivation

The olive tree (*Olea europaea L.*) is an evergreen and long-lived species, cultivated throughout the world for centuries for its edible fruits. This plant is suitable for all countries included in a latitude of 30°-45° in both hemispheres. In recent years, the area of olive production has increased worldwide, due to the introduction of innovations in cultivation systems (Russo et al., 2016).

At the end of 2017, the olive tree covered an area of almost 11 million hectares (FAO, 2017), with more than 90% of that area concentrated in the Mediterranean basin, characterized by cold and wet winters, and hot and dry summers. In recent decades, olive cultivation has shifted from traditional, extensive, widely spaced, rain-fed to intensive, sparsely spaced, and irrigated, leading to an increase in oil production (Erel et al., 2017). This increase in oil production has been accompanied by only a minor increase in cultivated area and can be attributed mainly to intensified management and an increase in yield per unit of cultivation area (International Olive Council, 2016).

In this regard, Spain, Italy and Greece are the world's leading producers of olive oil. Among European countries, Spain is the world's leading producer of olive oil (CAE, 2021) and accounts for 50% of the total area of olive trees, followed by Italy (24%) and Greece (17%) (Russo et al., 2016). In recent decades, these countries have been diversifying their cultivation system in olive

groves. In this sense, the main cultivation methods, which involve irrigation and mechanization and which have evolved throughout history are (Russo et al., 2016):

Traditional or extensive. It is characterized by low inputs of labour and resources. In addition, there are many structurally limiting factors: plantations on steeply sloping land, old and large olive trees scattered or cultivated in low-density plantations (less than 140 trees per hectare), poorly fertile soils, fragmentation of properties, and lack of irrigation. The plantations show low productivity, a marked alternation behaviour (yield once every two years) and, consequently, low profitability.

Semi-intensive. It is subject to more intensive agricultural practices (use of chemical fertilizers and pesticides for pest control; weed control through tillage or herbicides; irrigation; mechanized or semi-mechanized harvesting), high number of plants per hectare (planting density of 140 to 399 trees per hectare).

Super intensive. It is characterized by intensive and super-intensive agronomic interventions (very high-density planting, up to 2500 trees per hectare) located in flat areas; the use of non-vigorous olive varieties, the high contribution of fertilizers and pesticides, and large volumes of irrigation, the mechanization of harvesting and pruning practices; It can be effective about plant productivity (yield of 10 tons of olives per hectare, on average). However, there is no experience on the longevity of this type of olive groves, while extensive and semi-intensive ones have been known to be satisfactorily productive for centuries.

Olive crops and sustainability

The sustainable production of olive oil has become one of the main concerns and priorities of the sector, reducing the use of fertilizers, rationalizing the use of water, employing biological control strategies for the control of pests in bad weeds, taking care of the soil and reducing the risks of erosion, maintaining biodiversity by maintaining herbaceous plants in the cultivation lines and reducing the carbon footprint (Vicario-Modrono, 2023). Because olive crops have significant potential in mitigating climate change, since, as permanent crops, they provide carbon storage in soils (Palese et al., 2014). In this sense, in addition to adjustments in the agricultural production phase through practices such as sustainable intensification, the use of residues in olive grove management, and organic or integrated farming, there have also been notable responses in the industrial phase with innovations such as the implementation of a two-phase system (Cinar and Alma, 2008) or, in the bioeconomic context, by reusing by-products generated during the oil production process using biomass boilers as a replacement for fossil fuels, providing new value chains and reducing greenhouse gas emissions (Gallardo-Cobos y Sánchez-Zamora, 2017).

Nutrient deficiency harms production, while over-fertilization can reduce yields and oil quality, and increase environmental hazards and production costs. The effect of irrigation on nutrient availability and uptake is very significant (Zipori et al., 2020).

The application of organic matter (e.g., manure, compost) and cover crops can serve as substitutes for mineral fertilization with additional benefits to soil properties. The recycling of pruned material from the orchard, olive pomace and oil mill wastewater, as well as the use of recycled wastewater for irrigation, are potentially beneficial for the sustainability of the olive grove, but present the risk of environmental contamination (Zipori et al., 2020).

Casas de Hitos

Casas de Hitos is an agro-industrial company located in Cáceres (Extremadura, Spain), in the area of the Canal de la Dehesa (Casas de Hitos, 2023a; Casas de Hitos, 2023b), surrounded by an exceptional natural environment, in the hydrographic basin of the Guadiana River and surrounded by places such as the Monfragüe National Park, the Orellana and Sierra de Pela reservoirs and the Las Vegas del Guadiana and Las Villuercas greenway. It has around 6,000 hectares of its own, of which it has about 2100 hectares in operation; 75% super-intensive olive groves of different varieties and 25% almond trees. Due to its very nature as an agro-industrial

company, it can help meet SDG 2 Zero Hunger, and SDG 3 Good Health and Well-being, by producing olive oil, which is a healthy element of the Mediterranean diet.

Casas de Hitos, in addition to the field, has its oil mill, state-of-the-art, one of the most advanced in the world (minimum use of water, SDGs 6 and 14), with a daily mortturing capacity of about half a million kilos of olives per day, and a canopy decaper to also remove around 100,000 kilos of almonds per day. In this way, this company, through its investments in infrastructure, helps sustainable development by complying with SDG 9 Industry, Innovation and Infrastructure, facilitating an economic structure and activity.

The agricultural model is based on conservation agriculture and cares for biodiversity and the environment. They are currently in the process of receiving CO2-free company certification. They also practice a zero-waste policy, reducing, reusing and recycling the waste generated as much as possible. They are committed to the circular economy, reusing all the by-products of the mill and pruning, to enrich their soil, which is their great value. In fact, on the farm, they produce their compost from the remains of pruning and olive pulp. They are also firmly committed to a minimum water footprint. Optimization in the use of scarce resources, such as water, is very important. The olive grove has installed an automated and monitored fertigation system that allows them to be very efficient in the use of the available water. In addition, in a large part of the estate, due to its orography, they do not need to pump water to the olive trees, and they use solar energy to pump in those areas where it is necessary.

For all of the above, this company complies with three fundamental SDGs such as 12, 13 and 15, corresponding to Responsible Production and Consumption; Climate Action; and Life on Earth, as it promotes responsible consumption, has a special commitment to the fight against climate change and its activity halts the loss of terrestrial biodiversity.

Another example of their commitment to sustainability and the environment is the use of Polaris Ranger electric vehicles for field maintenance. They are powered by solar-powered rechargeable batteries. Therefore, carrying out daily work inside the olive grove with these vehicles eliminates the emission of exhaust gases into the atmosphere. In this way, they practice compliance with SDG 7 Affordable and clean energy, betting on decarbonization and the use of sustainable resources.

They apply the principles of Precision Agriculture, carrying out an exhaustive monitoring of their olive trees. This methodology has multiple benefits, both from the point of view of agricultural practices and from the point of view of the environment.

Through weather stations equipped with humidity probes and temperature sensors, they can apply treatments appropriate to the specific needs of the soil, carry out better pest and disease control, adapt irrigation to the real needs of the crop, etc. In this way, and through modern fertigation systems, they increase the benefits of agricultural activity for the environment and optimize the use of resources such as water and fertilizers.

The organization maintains a clear roadmap through reinvestment, generating employment preferably locally, and close to the production areas. In this way, generating economic activity that complies with SDG 8 Decent Work and Economic Growth, creating job opportunities and personal development.

They have developed a traceability system that allows them to control the olives at all times from the moment they are harvested, morttured in the mill, and delivered to customers as extra virgin olive oil. At Casas de Hitos they make use of the best technologies to ensure that their oils are of the highest excellence. They analyze residues, allergens, heavy metals, and everything, beyond what is required by regulations (SDG 3).

In all phases of the process, there is an exhaustive control of temperatures and production. Measurements are made on everything, at the inlets, and at all the outlets, to ensure that the oil is of the highest excellence. The olives that enter them are never from the ground, it is always aerial, to ensure that the best olive, with the optimum moment of ripeness, is always green. In addition, because olive oil is a living product, special care is taken in its maintenance, extraction, and especially conservation. They carry out peroxide index controls, controls on their tasting to

prevent them from oxidizing and deteriorating, and finally, they carry out sensory analyses, all their oils are tasted, to ensure that their analyses are exhaustive and offer the customer the best extra virgin olive oil (SDG 3).

They are committed to organic production, with approximately 20% of the surface area already certified as organic, and by 2025 it is expected to reach 100%. That will be their added value, their hallmark, offering a product of the highest quality, both in extra virgin olive oil and almonds, and also with the organic seal, they aspire to improve their positioning in the market. Cultivation in an "organic" regime (maintaining vegetation cover, limiting the use of pesticides through adequate grazing load, plant density, etc.) is very important for the maintenance of biodiversity (OSDG 15). It is possible to have intensive, highly productive tree crops in pastures without reducing biodiversity (SDG 15).

In Casas de Hitos they contribute to the well-being of the environment and the species that surround them. The area has more than 22 species of aerial invertebrates registered, 414 species of epigeal invertebrates (carabids, ants and spiders), 7 species of amphibians such as the pond turtle or the horseshoe snake that coexist with 12 other different species of bats (Chiroptera).

A paradise in which 103 species of birds also coexist, including almost a thousand Cranes and others as majestic as the Imperial Eagle, Black Vulture, Black Stork, White Stork, Marsh Harrier, Sandgrouse, Ortegas, Elanios, Red Kite, Black Kite, Short-toed Owl, Eagle Owl, Booted Eagle, and other smaller ones such as rollers. the lesser woodpecker's beak, the biusbitas or the raisel-tailed. Not forgetting mammals as rare and protected as the Iberian lynx (SDG 15).

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