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# GIS design application for "Sierra Morena Honey" designation of origin

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ABSTRACT

The quality label "Protected Designation of Origin" (PDO) protects and controls product quality. It is a normalized mode of typification and valuation. On the basis of the model proposed by Persano Oddo et al. [Persano Oddo, L., Piana, M.L., Barbattini, R., Ferrazzi, P., Longhitano, N., Piro, R., Ricciardelli D'Albore, G., Sabatini A.G., 2002. "La valorizzazione del miele attraverso le denominazioni di origine geografica", proc. of Atti del Convegno AMA "Il ruolo della ricerca in apicoltura", Bologna, 14-16 March, pp. 185–216] and the design of Bernardinelli et al. [Bernardinelli, I., Della Vedova, G., Milani, N., 2005. "Un approccio metodologico per la gestone del nomadismo in apicultura mediante i GIS: Esperienza nelle Valli del Natisone (Friuli Venecia Giulia)". Ati dell' Incontro-Siminario Mappatura delle aree nettarifere. Firenze], a Geographic Information System (GIS) was created for the management of honey produced in Sierra Morena (Andalusia, Southern Spain), and its development phases are presented in this work. Beekeeping is an activity closely related to this territory, and the GIS tool will be of great assistance in its management. A powerful, easy-to-update, and inexpensive open source code-based GIS web site was created to fulfill the needs of a work team characterizing the honeys entering the Protected Designation of Origin. The application is called SMHGIS (Sierra Morena Honey Geographic Information System). Extension and area delimitation aspects and orographic, orogenesic, climatic, and agronomic (nectar sources) features have been considered. An ordnance survey map of the area (1/10,000), data of the apiary census and honey production, and analysis and data for the characterization of honey subject to designation were used. The aim of this work is to describe the design and possibilities of GIS as a visualization tool for honey characterization and, secondly, as a management tool for the regulation of a Protected Designation of Origin.



## 1. Introduction

Honey is closely linked to a territory (Bernardinelli et al., 2005). Indeed, honey bees obtain their supply of nectar from sources within an approximate perimeter of 3 km from its hive. This availability of nectar sources, together with certain climate conditions, allows honey to be as diverse and variable as the factors influencing its production. Its characterization as an authentic and natural foodstuff can be achieved by studying its authenticity, both with respect to its production and to its botanical and geographical origin (Bogdanov and Martin, 2002).

This second aspect is a requirement for the voluntary quality label of "Protected Designation of Origin" undertaken by

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**Fig. 1 – Situation map of Sierra Morena, Andalusia (Spain).**

the European Union since 1992. Regulation 510/2006 currently describes the legal requirements to obtain the label.

Following this European quality policy, many food and drink manufacturers in Andalusia have voluntarily opted for quality seals. The benefits that they entail for the commercialization of a product, as well as their support of the rural environment, are objectives pursued by all sectors. Thus, the County Councils of the provinces of Córdoba, Seville, Jaén, and Huelva recently entrusted the University of Córdoba with the characterization of Sierra Morena honey. As part of this project, and with the aim of organizing this characterization and establishing honey production links with the geographical area of its origin, a GIS called SMHGIS (Sierra Morena Honey Geographic Information System) has been established to be applied to honey production in Sierra Morena (a mountainous area situated in Andalusia that extends over the provinces of Córdoba, Seville, Jaén, and Huelva, shown in Fig. 1). To develop the GIS, recent work has been studied. Persano Oddo et al. (2002) catalogued the environmental factors influencing honey quality under Protected Designation of Origin. Bernardinelli et al. (2005) showed as a preliminary note a GIS design as tool applied to geographical distribution of nectar sources in "Valli del Natisone." Bellavance (1999) carried out a GIS application according to hive management optimization. Related to our work, Filis et al. (2003) developed a GIS-Expert System to manage relevant information for beekeepers concerning the location of apiaries and the quality of honeys by means of nectar sources and environmental variables in Greece. Finally, Jo et al. (2001) used satellite images and GIS