

# Birds in organic olive grove: the case from Zakynthos island

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## Abstract

*Olive orchards are the basic tree cultivation in the Mediterranean and dominate its rural landscape (Loumou & Giourga, 2003). Although an agro-ecosystem, it resembles natural Mediterranean ecosystems and many species have been adopted in this man-made habitat. Species like Olive-tree Warbler (*Hippolais olivetorum*), Olivaceous Warbler (*Hippolais pallida*) and Blackcap (*Sylvia atricapilla*) are very common and characteristic species on these habitats. In this study we analyzed the biological richness of birds between olive orchards of organic and conventional farming in Zakynthos Island to assess both the importance of olive ecosystems in bird biodiversity and the contribution of organic agriculture on it. The survey of birds held in 2010 in all seasons using mapping of observation and "Look-see" methods (Bibby et al., 1992). Totally 71 species observed in the olive groves of the island, both in organic farm and in conventional ones. Of these species, 31 occur only during migration. Eleven birds are permanent residents, enriched with nine other species during winter. In Mediterranean, plenty of fruits in maquis (10 to 20 species of fruit with the maximum availability of ripe fruit from December to February) offer an important food source for the wintering birds. Olive orchards can be used as an alternative important habitat (Munoz-Cobo & Purroy 1980) although because of the low variety of fruits in these cultures, the natural existence of other fruit trees and shrubby species increasing the numbers of wintering birds (Rey 1993). During spring 18 migratory species used the area for breeding. We didn't observed large differences in bird biodiversity between organic and conventional olive crops although seed-eating and insectivorous species were more in organic farming. However the largest variation was observed between pure olive (small heterogeneity) and olive groves with a greater variety of microhabitat (e.g. presence of hedges, proximity to forest land, riparian vegetation).*

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## Introduction

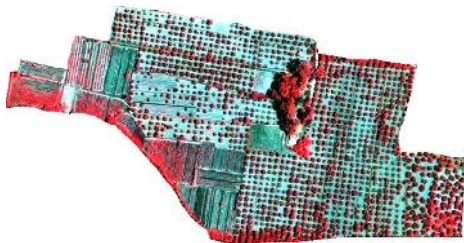
The olive orchards constitute one of the main tree crops in Greece, accounting for 15% and 78% of the total cultivated land and the land occupied by orchards respectively (Solomou & Sfougaris, 2010). This type of tree crop can be considered as an alternative Mediterranean forest like the evergreen and pine forests due to its high rate of spatial expansion in many hilly areas for thousands of years, a fact that has increased the number of different avifauna species adapted to this specific anthropogenic habitat. The olive fruit is a highly nutritious food for many frugivorous species, while the presence of insects on these trees attracts a large number of insectivorous bird species. Some species like the Olive-tree Warbler (*Hippolais olivetorum*), Eastern Orphean Warbler (*Sylvia crassirostris*), Olivaceous Warbler (*Hippolais pallida*), Blackcap (*Sylvia atricapilla*) are very common or characteristic passerine species on this agro-habitat (Singer-Bruun, 1970). In general a number of birds nest and feed on these trees, while others wintering and a third group of birds just using them during migration stop overs.

Generally organic farming increases up to 30% species richness and 50% species abundance in comparison with conventional farming systems although the results vary considerably between studies and groups of organisms (Bengtsson et al. 2005). Birds, predator insects, soil organisms and plants respond positively to organic farming, as opposed to non-insect terrestrial invertebrate predators and parasites (Bengtsson et al. 2005).

The main aim of this work was to record and compare the biological diversity of birds among groves of organic and conventional farming in Zakynthos Island and to assess the contribution of organic agriculture on biodiversity.

## Study Area – Methodology

The main study area was the organic farm Minotou (Romiri location) where the main actions of the program BiolMed in Zante have been implemented (Map 1), so as to gain comparative results. On the other hand adjacent properties and in few cases other properties in other locations of the island were used for the needed surveys in conventional olive groves.



“Minotos” organic farm

Bird census held in 2010 on seasonal time scale with more intensive effort during the spring season. We used two parallel methodological approaches. According to the first one, we mapped all the observations made on an organic farm during the reproductive period so as to correlate the presence of particular species with their respective micro-habitats (Bibby et al., 1992). The

second approach was based on "Look-see" method (Bibby et al., 1992) by following randomly selected observation points located on default habitat types. The latter

method was used in an organic farm outside the breeding season as well as in conventional orchards. Birds were identified and recorded either visually or vocally while their relative abundance was estimated by using a six-level scale (-: accidental, +: very small presence, ++ small presence, +++ abundant, ++++: common +++++: very common). The "Look-see" is the most suitable method for rapid assessment of ornithological areas; it allows a quick ornithological identification based on the existing knowledge on each area or the habitat requirements of birds.

## **Results – Discussion**

A total number of seventy-three (73) bird species was observed in the olive groves of Zakynthos Island, both organic and conventional orchards (Appendix 1). From this group of species, thirty-two (32) occur only during the spring or autumn migration. Eleven (11) birds were permanent residents of these areas, while nine (9) other species of the surrounding mountains or from northern areas, used olive groves for wintering. The largest proportion of these species occasionally exploits these areas for the benefits provided by these crops (olives). During winter, a major food source in the Mediterranean Zone are fruits in maquis vegetation, which are particularly abundant during this period (10 to 20 types of fruits). For example maximum availability of ripe fruit from December till February makes these areas important wintering grounds for many European passerine birds, including frugivores. However, the gradual reduction and disappearance of natural vegetation in many lowland and hilly areas of the Mediterranean has caused significant loss of these food sources for many species (Andre's & Ojeda 2002). As a result many frugivorous bird species were forced to use groves as an alternative habitat during this period (Munoz-Cobo & Purroy 1980).

The cultivated and wild olives contain very high levels of lipids up to a range of 40-66% of dry mass, making them among the most energy-rich fruits in the Mediterranean (Jordano 1987) and particularly important wintering habitats (Rey 1993). Despite the low variety of fruits in these cultures, the species and abundance richness of wintering birds have been increased due to regional existence of other natural fruiting trees. However, this does not occur with other species which are characterized mostly as insectivorous and whose their presence in groves is less often. The size of the olive fruit is a determinant factor for the presence of birds as large fruits can be consumed only by larger body size birds (e.g. thrushes), although some species like Blackcap, Sardinian Warbler and Robin have developed techniques to peck the olive fruit. Eating a wide variety of arthropods, leaves and seeds of grasses in the olive groves has been found to help birds to enrich their diet with nutrients (Rey & Valera 1999). The presence of natural shrub layer into the crops may attract species searching for food in bushes where these species are absent from intensified crops.

The intense harvesting and agricultural practices that reduce habitats heterogeneity of the grove, creating a spatially homogenized ecosystem with reduced food sources for birds, which has negative effects on the diet of birds as well as on the abundance and diversity of species. Some of these ecological problems can be partially overcome by the presence of small hedgerows and natural stands in or surround the agricultural landscape (Rey, 2011).

Besides the eleven (11) permanent species, we observed nineteen (19) additional species during spring migration which remained in the area for breeding. The majority of these species use natural vegetation (shrubs, trees or riparian vegetation) for breeding. The olive trees which characterize the homogeneous landscape of the lowland area in Zakynthos Island appear as a monoculture with low presence of natural

vegetation, in contrast to the hilly land where the frequent presence of forest islets resulted to similar differentiation mainly on the presence of breeding avifauna species. Other factors that seems to influence the diversification of species occurrence were the different treatment of the soil cover and the number of trees per hectare. More species were observed in older orchards which had fewer trees and more natural land cover than the young groves with the intensive ground processing (cover treatment).

No significant differences were observed between organic and conventional olive crops with the exception of grain-eating and insectivorous species that were more in organic farming. The largest difference was observed between pure olive (small heterogeneity of rural areas) and olive groves with a wider variety of microhabitats (e.g. presence of trees and bush hedges, proximity to wooded area, presence of riparian vegetation). However, in our area, the presence (or absence) of many species was strongly influenced by intense illegal hunting activity during the spring period. The human disturbance was detected in both the organic farm and the conventional olive groves, affecting mainly hunted species (e.g. thrushes) as well as most of the breeding species.

## **Conclusions**

The olive groves and in particular the traditional as well as those located in proximity to natural ecosystems provide shelter, food and protection for numerous species of small and large mammals, birds, plant species etc and thus contribute decisively to maintaining the local and regional biodiversity.

Requirement and purpose of the Integrated Production of Olives is the preservation of the environment of olive groves as natural refuges for wildlife. These areas should retain the naturalness and not be polluted.

According to the criteria of the IOBC (International Organization for Biological and Integrated Control of Noxious Animals and Plants) at least 5% of agricultural land (excluding forests) should be identified and are managed as ecologically protected areas (without use of pesticides and fertilizers) to increase local biodiversity.

Important ecological components of the olive orchards landscape such as natural micro-habitats characterized by plant species, agricultural landscape (Rey, 2011) water ponds, stone walls, fallow parcels and hedgerows with native species should be integrated (or at least some of them) to traditional agricultural practices of local farmers based on a strategy of regional biodiversity enrichment.

## **REFERENCES**

- Bibby, C., Burgess, N., Hill, D., Mustoe, S. 1992. *Bird Census Techniques*, Second Edition, Academic Press.
- Loumou, A., Giourga, Ch. 2003. Olive groves: "The life and identity of the Mediterranean". *Agriculture and Human Values* 20: 87–95, 2003.
- Muñoz-Cobo, J. & Purroy, F.J., 1980. Wintering bird communities in olive tree plantations of Spain. *Proceedings of VI International Conference on Bird Census Work*, Gottingen, pp. 185–199.
- Rey, P.J. 1993. The role of olive orchards in the wintering of frugivorous birds in Spain. *Ardea*, 81, 151–160.