

## THE EFFECT OF MANAGEMENT PRACTICES AND LANDSCAPE CONTEXT ON VINEYARD BIODIVERSITY

Authors: Athanasia MANDOULAKI<sup>1</sup>, Ioannis VOGIATZAKIS<sup>2</sup>, Menelaos STAVRINIDES<sup>1\*</sup>

<sup>1</sup>Cyprus University of Technology, 3036 Limassol, Cyprus

<sup>2</sup>Open University of Cyprus, 2252 Nicosia, Cyprus

\*Corresponding author: [m.stavrinides@cut.ac.cy](mailto:m.stavrinides@cut.ac.cy)

### Abstract:

**Context and purpose of the study** - Intensification is considered one of the major drivers of biodiversity loss in farmland. The more intensive management practices that have been adopted the last decades, contributed to species declines from all taxonomic groups. Moreover, agricultural intensification has led to an important change of land use. Complex, mixed agro-ecosystems with cultivated and non-cultivated habitats have been converted to simplified, intensive and homogeneous ones with severe effects on biodiversity. The present study aimed at reviewing the most recent literature of the effects of agricultural practices and surrounding landscape on biodiversity in Mediterranean vineyards.

**Material and methods** – Several scientific papers and research projects, studying the effects of managements practices and landscape on vineyard biodiversity and the methods already used to assess and moderate species decline, were reviewed.

**Results** – Tillage, irrigation, pesticide and fertilizer use as well as the destruction of the natural vegetation in hedgerows and field margins are some of the agricultural practices that are responsible for most declines in species richness. In addition to management practices, a higher or lower landscape heterogeneity provides a higher or lower probability for the species to find food resources, shelter or sites for reproduction, overwintering or oviposition. A plethora of metrics have been developed to quantify landscape and measure the landscape heterogeneity. The development of a biodiversity metric tool that quantifies and evaluates the effect of vineyard management practices is crucial to help farmers to choose the most sustainable option that will benefit both biodiversity and production.

**Keywords:** vineyard, intensification, biodiversity, management practices, landscape, biodiversity metric

### 1. Introduction.

## THE EFFECT OF MANAGEMENT PRACTICES AND LANDSCAPE CONTEXT ON VINEYARD BIODIVERSITY

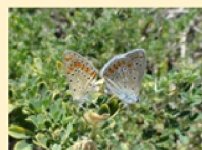
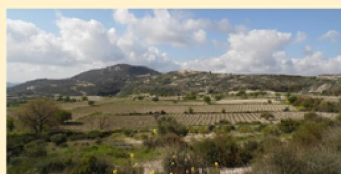
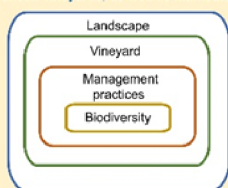
Athanasia MANDOULAKI<sup>1</sup>, Ioannis VOGIATZAKIS<sup>2</sup>, Menelaos C. STAVRINIDES<sup>1</sup>

<sup>1</sup>Cyprus University of Technology, 3036 Limassol, Cyprus

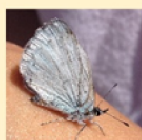
<sup>2</sup>Open University of Cyprus, 2252 Nicosia, Cyprus

### INTRODUCTION

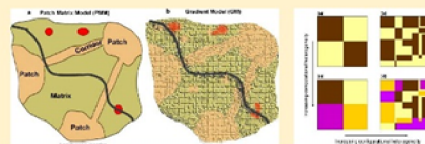
Intensification is considered one of the major drivers of biodiversity loss in farmland. The more intensive management practices that have been adopted in the last decades, contributed to species declines from all taxonomic groups. Furthermore, agricultural intensification has led to an important change of land use. Complex, mixed agro-ecosystems with cultivated and non-cultivated habitats have been converted to simplified, intensive and homogeneous ones with severe effects on biodiversity. The present study aimed at reviewing the most recent literature of the effects of agricultural practices and surrounding landscape on biodiversity in Mediterranean vineyards, as well as marketing schemes promoting wines produced under biodiversity conserving practices.



Tillage, irrigation, pesticide and fertilizer use as well as the destruction of the natural vegetation in hedgerows and field margins are some of the agricultural practices that are responsible for most declines in species richness.



A higher or lower landscape heterogeneity provides a higher or lower probability for the species to find food resources, shelter or sites for reproduction, over-wintering or oviposition. A plethora of metrics have been developed to quantify landscape and measure the landscape heterogeneity.



The development of a biodiversity metric tool that quantifies and evaluates the effect of vineyard management practices is crucial to help farmers to choose the most sustainable option that will benefit both biodiversity and production.



### REFERENCES

- Werner, J.D., Vorkley, J.A. & Wilson, J.D. 2000. Farm-level biodiversity: is landscape heterogeneity the key? *WILDLIFE IN AGRICULTURE AND LANDSCAPE*, 18(4), pp. 185-198.
- Pollock, M.H., Johnson, J.P., Brown, D.L., Rogers, B. & Macdonald, D.D. 2007. A comparison of butterfly populations on regularly and irregularly managed farmland. *Journal of Insect Conservation*, 11(1), pp. 33-39.
- Form, M., Ratti, R. & Kallala, C. 2013. The role of ecological infrastructure on beneficial arthropods in vineyards. *Spanish Journal of Agricultural Research*, 11(1), pp. 1-11.
- Capra, P., Catalano, C., Garau, J. 2007. Preliminary study of the effect of soil management systems on the subterranean life of a vineyard in northeastern Spain. *Crop Protection*, 26, pp. 104-110.
- Leardi, A., Bianchi, T., Basso, D., Mezzalana, F., Spina, R.M., Turchetti, L., et al. 2016. Understanding and quantifying the diversity of vineyard - a review on recent (past) characteristics, data sources and landscape metrics. *Food, Food, Food*, 259, 31-41.
- Lozano, Z., Zedler, J. & Chytrý, M. 2003. Seasonal dynamics and diversity of weed vegetation in a field and roadside vineyard. *Oikos*, 101(1), pp. 1-17.
- Puj-Monasterio, X., Delgado, C., Torres, I., Roldán, J., Fariñas, E., Dorado, J., Arizaletxe, A., Fariñas, C. 2017. Effects of organic and conventional vine management on vineyard biodiversity: Agriculture, Conservation and Environment, 2(3), pp. 19-26.
- Storck, L., Augenstein, H. & Rieger, A. 2016. The effects of organic and conventional vineyard management on the butterfly (Lepidoptera) diversity in a wine-growing region of southwestern Germany. *Acta Oecologica*, 105, pp. 149-155.
- Storck, L., Augenstein, H., Rieger, A., 2016. Vineyard vegetation management and biodiversity: a review on recent (past) characteristics, data sources and landscape metrics. *Food, Food, Food*, 259, 31-41.
- Storck, L., Augenstein, H., Rieger, A., 2016. Vineyard vegetation management and biodiversity: a review on recent (past) characteristics, data sources and landscape metrics. *Food, Food, Food*, 259, 31-41.
- The Lead Rule Sustainable Winegrowing in California. <http://www.sustainablewinegrowing.com>
- The Biodynamic and True Italian in South Africa. <http://www.biodynamicwines.co.za>
- Wine. <http://www.wine.com>



21<sup>st</sup> G/ESCO International Meeting  
A Multidisciplinary Vision towards Sustainable Viticulture  
June 23-28, 2019 | Thessaloniki | Greece

