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Organic farming increases biodiversity and spontaneous vegetation in Mediterranean vineyards

Researchers from CREAF and the UAB have carried out a study to evaluate the contrasting effects of conventional and organic management in six vineyards in the Penedès. The results reveal that the vineyards under organic management show a greater richness of plant species with different adaptive strategies. This sustainable approach sets a guideline for a more ecological future in Mediterranean viticulture.

Ecological agriculture, also known as organic farming, is a holistic and sustainable approach that places a strong emphasis on environmental health, biodiversity, and the overall well-being of ecosystems and people. This methodology is gaining increasing recognition and support as a response to the ecological challenges posed by conventional agriculture.

In recent decades, the adoption of ecological management practices in Mediterranean vineyards has gained significant momentum. This can be attributed to its proven ability to deliver satisfactory crop yields while simultaneously preserving environmental quality, maintaining biodiversity and the provision of ecosystem services and functions[1]. However, it is important to note that despite these notable advantages, conventional farming practices still dominate the viticulture landscape.

One of the components of agricultural ecosystems is the spontaneous plant species, often known as "weeds." These plants are essential ecological indicators of agroecosystem

resilience, as they exhibit remarkable sensitivity to environmental conditions and management practices while offering a multitude of ecological functions and services[2,3]. Therefore, it is essential to understand how spontaneous plant communities in vineyards with differing agricultural management are assembled, considering the competitive response capacity of the plants and their contribution to ecosystem functions.

With this objective in mind, it was carried out a comprehensive study evaluating the contrasting effects of conventional and organic management, as well as soil conditions, in six different Penedès vineyards. The assessment focused on the diversity and composition of spontaneous plant communities, as well as the functional diversity of the competitive response capacity of species and the functional diversity of the provisioning of services related to pollination.

The results revealed that spontaneous plant communities and their functions are more responsive to management conditions than to soil conditions. Vineyards under organic management exhibited a greater richness of plant species with diverse competitive response strategies to adapt to various environmental conditions and agricultural practices. Additionally, organic vineyards hosted richer, more extensive, and more resilient spontaneous plant communities that enhanced the provisioning of pollination services. In other words, ecological systems hold plant communities with more diverse floral characteristics and related to specific pollinators, contributing to a more diverse pollinator community[4]. Conversely, conventional farming systems tended to favor spontaneous plants that are wind-pollinated or have floral attributes appealing to a less diverse range of pollinators.

This study underscores the importance of organic farming in maintaining local plant diversity in Mediterranean vineyards and improving the provision of ecosystem functions and services in these agricultural landscapes. In conclusion, the research advocates for ecological agriculture as a promising alternative to conventional methods in vineyards, offering a path towards a more sustainable and harmonious coexistence with nature[5].

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References

[1] Tscharntke, T., Klein, A.M., Kruess, A., Steffan-Dewenter, I., Thies, C., 2005. **Landscape perspectives on agricultural intensification and biodiversity** – *Ecosystem service management. Ecol. Lett*. 8, 857–874. https://doi.org/10.1111/j.1461-0248.2005.00782.x
[2] Bengtsson, J., Ahnström, J., Weibull, A.C., 2005. **The effects of organic agriculture on biodiversity and abundance: a meta-analysis.** *J. Appl. Ecol.* 42, 261–269. https://doi.org/10.1111/j.1365-2664.2005.01005.x
[3] Lavorel, S., Grigulis, K., 2012. **How fundamental plant functional trait relationships scale-up to trade-offs and synergies in ecosystem services.** *J. Ecol.* 100, 128–140. https://doi.org/10.1111/j.1365-2745.2011.01914.x
[4] Rotchés-Ribalta, R., Winsa, M., Roberts, S.P.M., Öckinger, E., 2018. **Associations between plant and pollinator communities under grassland restoration respond mainly**

to landscape connectivity. *J. Appl. Ecol*. 55, 2822–2833. https://doi.org/10.1111/1365-2664.13232

[5] Roser Rotchés-Ribalta, Joan Marull, Joan Pino 2023. **Organic farming increases functional diversity and ecosystem service provision of spontaneous vegetation in Mediterranean vineyards**, *Ecological Indicators*, Volume 147, 2023, 110023, ISSN 1470-160X, https://doi.org/10.1016/j.ecolind.2023.110023.

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