Abstract

The dehesas of Spain and Portugal are multifunctional Mediterranean agroforestry systems that have been cultivated in varying intensities and usage patterns for centuries. They are characterized by scattered oak trees with an herbaceous understory grazed by livestock. Recognized as Europe's largest high nature value farming system, these open woodlands support abundant biodiversity and an array of ecosystem services, while providing food, forage, fodder, and fuel. The ecological, economic, and social integrity and viability of these agroecosystems are sustained by the presence of scattered oak trees. A number of studies in recent years have quantitatively documented oak tree cover change in the dehesas over various temporal and spatial scales, with many showing a trend of decline in tree cover and density and suggesting the dehesas may be endangered. However, an overview of the rates, patterns, and drivers of tree cover and density change is absent in the peer-reviewed literature and is needed to improve dehesa policy and management across scales. We provide a systematic review of the studies that quantitatively analyze changes in tree cover and density in the dehesas, with a focus on the study characteristics, calculating and synthesizing annual net change rates, and analyzing associated drivers of change. We found 19 relevant studies and separated them into 62 distinct spatio-temporal cases covering the period between 1956 and 2015, with 38 cases looking at dehesa land cover change and 24 looking at tree density change. The average annual net change rate of dehesa land cover was calculated to be -0.19%. Tree density was found to be slightly increasing on average at 0.1% per year^{-1}, but the number of studies on density were too few to draw strong conclusions from this figure. Political drivers, especially EU policies, were found to be the most prominent underlying drivers of tree cover change, and agricultural intensification and land abandonment were found to be the most prominent proximate drivers. We point to a need for dehesa management and policy to address the prominent pressures placed on it and their indirect drivers, with a focus on correcting the intensive livestock husbandry that is currently supported by the CAP. We also point to a need to conduct further tree cover and density change studies across the dehesas for improved insights into the rates of change and what drives them. For findings to be scaled up for appropriate and timely management and policy responses, future research into dehesa tree cover and density change could be coordinated to offer comparable data while remaining place-based for insights into the mosaic of local-level processes and actors that are present across the Iberian Peninsula.