



Are vineyards important habitats for birds at local or landscape scales?

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Abstract

In Europe, monitoring indicates that farmland bird populations are declining. Numerous studies at different spatial scales have considered bird ecology in farmland, but viticulture has received little attention. We carried out bird surveys at two spatial scales over two years in western France. We assessed the contribution of vineyards to bird diversity at landscape scale and undertook plot-scale analyses of habitat selection in vineyards and their associated semi-natural habitats. We detected a strong negative relationship between vineyard cover and both abundance and species richness of birds. Only two species responded positively to vineyards: Woodlark *Lullula arborea* and Skylark *Alauda arvensis*. Of the 93 species detected at landscape scale, only 16 were frequent users of vine plots. The majority of these species were found to select semi-natural habitats adjacent to grapevines, in particular areas with trees. Only Woodlarks positively selected vineyards as opposed to semi-natural habitats but no consistent selection criteria between different vineyard habitat variables could be detected. Our study shows that, although wine-growing landscapes may be species-rich, fewer species use vineyards themselves, and at low levels of abundance. Planting or maintaining semi-natural woody vegetation are popular management approaches, which our data suggest may encourage generalist species without improving vineyard habitats for open farmland specialists.

Zusammenfassung

Erfassungen von Vögeln der Agrarlandschaft zeigen, dass deren Populationen in Europa zurückgehen. Zahlreiche Untersuchungen haben sich mit der Ökologie der Vögel von landwirtschaftlichen Nutzflächen befasst, aber Weinbauflächen wurden wenig beachtet. Wir führten zwei Jahre lang Vogelerfassungen auf zwei räumlichen Ebenen in Westfrankreich durch. Wir bestimmten auf der Landschaftsebene den Einfluss von Weinbauflächen auf die Vogeldiversität und analysierten auf der Ebene von Probeflächen die Habitatwahl auf Weinbauflächen und in angegliederten halb-natürlichen Habitaten. Wir stellten einen stark negativen Zusammenhang zwischen Deckungsanteil der Weinbauflächen und Abundanz bzw. Artenreichtum der Vögel fest. Nur zwei Arten reagierten positiv auf Weinbauflächen: Heidelerche (*Lullula arborea*) und Feldlerche (*Alauda arvensis*). Von den 93 in der Landschaft nachgewiesenen Arten traten nur 16 häufig in Weinbauflächen auf. Die Mehrzahl dieser Arten wählten halb-natürliche Habitats in der Nähe zum Wein, insbesondere Flächen mit Bäumen. Nur die Heidelerche bevorzugte Weinbauflächen gegenüber halb-natürlichen Habitaten; es konnten aber keine konsistenten Selektionskriterien zwischen verschiedenen

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Habitatvariablen der Weinbauflächen ermittelt werden. Unsere Untersuchung zeigt, dass, auch wenn Weinbaulandschaften artenreich sein können, nur wenige Arten die Weinanbauflächen selbst nutzen und das auch nur in geringer Abundanz. Neuanlage oder Erhalt von halb-natürlicher Gehölzvegetation sind populäre Managementmaßnahmen, die, wie unsere Daten nahelegen, generalistische Arten fördern können, ohne dass Weinbauhabitate für Spezialisten der offenen Agrarflächen verbessert werden. © 2016 Gesellschaft für Ökologie. Published by Elsevier GmbH. All rights reserved.

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Introduction

Declines in European farmland biodiversity observed over the past three or four decades are clearly attributable to the combined effects of homogenisation of rural landscapes and widespread intensification of farming practises (Chamberlain, Fuller, Bunce, Duckworth, & Shrubbs, 2000). In France, as elsewhere in Europe, farmland bird monitoring indicates that even the populations of common bird species associated with farmland habitats have steeply declined (Siriwardena et al., 1998; Donald, Green, & Heath, 2001b; Voříšek et al., 2010). Twenty species that form the French farmland bird index declined by 25% between 1989 and 2009 (Jiguet, 2010). A growing body of evidence suggests that in general, farmland biodiversity will benefit from increasing heterogeneity in farmland landscapes (Benton, Vickery, & Wilson, 2003), particularly through the maintenance, creation and management of semi-natural habitats surrounding land used for agricultural production (Fuller, Hinsley, & Swetnam, 2004; Haslem & Bennett, 2008). In the case of birds, careful management of such habitats can help to alleviate the key problems of limited food resources and breeding sites for farmland bird populations (Wilson, Evans, & Grice, 2009). Most of this work on the relationships between wildlife conservation and farming has focused on the flora and fauna of annual crops, grassland and their associated semi-natural habitats while certain forms of agriculture and in particular viticulture have received less attention.

In parts of southern Europe viticulture is a dominant form of agriculture and in France 3.7% of agricultural land (about 800,000 ha) is used for wine-growing (OIV, 2012). This type of production presents a particular set of opportunities and challenges for the preservation of biodiversity. Vineyards tend to be intensively managed; it has been shown that 20% of all pesticides used in France are consumed by viticulture alone, 80% of which are fungicides, which in turn represent 30% of fungicides used at national level (Aubertot et al., 2005). Studies of vineyard biodiversity have often focused on potentially beneficial organisms in the context of conservation biological control (Begum, Gurr, Wratten, Hedberg, & Nicol, 2006; Thomson & Hoffmann, 2009, 2013) but studies on the specific role of viticulture in the maintenance of farmland biodiversity are relatively rare (Bruggisser, Schmidt-Entling, & Bacher, 2010; Tanadini, Schmidt, Meier, Pellet, & Perrin, 2012). Studies of birds in vineyards tend to

focus on bird damage to grapes (Somers & Morris, 2002; Kross, Tylianakis, & Nelson, 2012), or on the possible role of birds themselves as agents of insect biological control (Jedlicka, Greenberg, & Letourneau, 2011). Therefore, we know little about the contribution vineyards make to maintaining biodiversity in general, although they have some potential advantages to offer. They provide woody cover all year round and sometimes green cover in between the rows of grapevines and, like other types of farmland, they contain a range of associated semi-natural habitats outside of the areas strictly used for production, such as grassy turning bays, scrub, woodland patches and isolated trees. Only a few authors have pointed out the use of vineyards as corridors by woodland bird species (Brotons & Herrando, 2001) or have demonstrated the positive effects of green cover for certain species (Sierro & Arlettaz, 2003; Arlettaz et al., 2012).

Wine-growers are increasingly interested in the question of biodiversity management on their farms and collective action is being taken to reintroduce biodiversity or to promote “green” vineyards (Gillespie & Wratten, 2012; Van Helden, Guenser, & Fulchin, 2012). A major reason is that biological diversity may help reduce pesticide use through natural regulation of grapevine pests, while also enhancing a range of other ecosystem services such as weed suppression, plant and insect conservation and ecotourism (Fiedler, Landis, & Wratten, 2008). In response to urbanisation in wine-growing areas or market globalisation, an increasing number of wine producers aim to sell their produce on site or locally (Jarrige, 2004; Brugarolas, Martinez-Carrasco, Bernabeu, & Martinez-Poveda, 2010). After large-scale loss of hedgerows in Europe over the past few decades (Petit, Stuart, Gillespie, & Barr, 2003; Pointereau, 2001), and because hedgerows can perform multiple agro-ecological functions (Baudry, Bunce, & Burel, 2000), incentives for farmers to adopt environmentally or wildlife friendly farming now often focus on hedge-planting. Such schemes are often applied in a standardised manner over wide areas and local planters may be unaware of the potential consequences of planting (Busck, 2003). If viticulturists are to respond to the demand for a more environmentally conscious approach to wine-growing, better knowledge of the relationships between vineyard management and wildlife is needed. Within this context, and basing our research on birds, often used as indicators of farmland biodiversity, and well-studied in other agricultural systems, our aims were to

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