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Changing the fallow paradigm: A win–win strategy for the post-2020 Common Agricultural Policy to halt farmland bird declines

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Abstract

1. Farmland bird populations have declined sharply due to agricultural intensification. In Europe, these negative population trends have been linked to the loss of semi-natural vegetation types, particularly fallow land. The work of Sanz-Pérez et al. (2019) has far-reaching implications for the conservation of farmland biodiversity. We argue that it supports a new paradigm for the understanding and management of fallows that should be integrated into the forthcoming post-2020 Common Agricultural Policy (CAP).
2. Following the abolition of mandatory set-aside by the European Union in 2008, fallows declined steadily in Europe until 2015, when the CAP implemented greening measures. These restored the requirement to leave 5% of arable land as ecological focus areas (EFAs) to enhance biodiversity. While fallows are one of the most beneficial forms of EFA for farmland birds, farmers prefer the less conservation effective planting of nitrogen-fixing and catch crops (currently more than 70% of EFAs). CAP incentives have been insufficient to make unproductive EFAs such as fallows more attractive to farmers.
3. Sanz-Pérez et al. (2019) evaluated the impact of different fallow land management practices on the abundance of specialist farmland birds. They concluded that extensive practices – such as tilling or shredding once or twice per year before the breeding season – were more beneficial to these declining species than leaving fallows unmanaged and recommended their incorporation into agri-environment schemes. But such schemes have had low uptake, and thus a limited potential to drive the widespread recovery of farmland birds at either national or European levels. The post-2020 CAP, currently under development, should integrate simple fallow management practices within new conditionalities or eco-schemes to address this problem.
4. *Synthesis and applications*. The loss of fallow land underlies the decline of farmland birds. The post-2020 CAP must overcome past mismatches between incentives to farmers and biodiversity benefits and increase farmers' uptake of the most beneficial options for biodiversity, including fallows. Promoting light management of fallow land within the new CAP eco-schemes is a win–win strategy because it would simultaneously allow farmers to continue extensive weed control and enhance habitat quality for farmland birds.

KEYWORDS
agricultural intensification, agricultural management, biodiversity conservation, Common Agricultural Policy, ecological focus areas, greening, legislation, set-aside

1 | INTRODUCTION

Agricultural intensification is a major driver of biodiversity loss worldwide (Maxwell, Fuller, Brooks, & Watson, 2016; Stanton, Morrissey, & Clark, 2018). This is particularly problematic in Europe where farmland occupies around 50% of the land area (European Environmental Agency, 2015). The decline of farmland biodiversity occurs across all taxa but is best exemplified in farmland birds (e.g. Donald, Sanderson, Burfield, & van Bommel, 2006; Heldbjerg, Sunde, & Fox, 2018; Inger et al., 2015). Results from the Pan-European Common Bird Monitoring Scheme for 39 common farmland birds monitored between 1980 and 2015 show that this bird group is undergoing the steepest population declines, with a regressive trend of −55% (PECBM: http://www.ebcc.info/european-wild-bird-indicators-2017-update/). The loss of landscape heterogeneity and the disappearance of semi-natural vegetation types, such as field margins and fallow land, are key drivers of farmland bird decline (Benton, Vickery, & Wilson, 2003; Traba & Morales, 2019).

Recent work by Sanz-Pérez et al. (2019) adds further support to the established notion that fallows are among the most beneficial land use for farmland birds. Most importantly, they showed which fallow management practices increased the presence of three species of conservation concern. Fallow land (or 'set-aside') is that part of an arable farm left unseeded for one or more years in a crop rotation system. The land is left to rest to restore soil moisture, structure and nutrient levels, as well as to control weeds. Traditionally, fallow fields have been managed in extensive ways – such as livestock grazing, low ploughing frequency – to control weeds and provide suitable conditions for subsequent sowing and increased crop production. The high conservation value of fallows arises from the substantial heterogeneity created by such extensive management. Fallows offer a wide diversity of food resources and vegetation structure that provide feeding and shelter requirements for a host of taxa (Henderson, Cooper, Fuller, & Vickery, 2000; Kovács-Hostyánszki, Korösi, Orci, Batáry, & Báldi, 2011; Kuussaari, Hyvönen, & Härmä, 2011; van Buskirk & Willi, 2004). Fallow land is also a key reproductive habitat for many farmland birds, including species of European conservation concern (e.g. Giralt et al., 2018; Magaña, Alonso, Martín, Bautista, & Martín, 2010; Morales, Traba, Delgado, & García de la Morena, 2013; Vickery, Bradbury, Henderson, Eaton, & Grice, 2004).

Sanz-Pérez et al. (2019) showed that specialist farmland birds respond to differences in vegetation structure created by the management practices carried out on fallow fields. They demonstrated that the low-level use – once or twice per year before the bird reproductive season – of practices such as tilling and shredding generates vegetation with sparse cover and low-to-medium height suitable for these species. Farmland bird species have segregated ecological niches to coexist (Tarjuelo et al., 2017; Traba, Morales, Carmona, & Delgado, 2015). To maintain a healthy community of farmland birds, landscapes must include multiple habitat features to provide a suitable range of species' requirements. A mosaic of heterogeneous fallows resulting from the use of various extensive practices can provide different niche opportunities that positively influence the recovery of threatened farmland birds, particularly in highly intensified and homogeneous agricultural landscapes (Tscharntke, Batáry, & Dormann, 2011). The work of Sanz-Pérez et al. (2019) reveals another important factor with far-reaching implications for the promotion of farmland biodiversity. Leaving fallows unmanaged leads to an excessive growth of weeds that is unsuitable for the species studied. Fallows that grow too dense and tall are avoided by farmland birds and disliked by farmers, who fear that excessive weed growth will reduce crop production. This finding therefore introduces a new win–win paradigm, which challenges the nowadays widespread view among farmers that 'there is nothing less productive than a fallow', as opposed to the traditional use of fallow as a recovery phase of the crop cycle. If the European Commission uses these scientific findings, the new post-2020 Common Agricultural Policy (CAP) could encourage farmers to use methods of fallow land weed control that benefit both crop production and farmland birds. Sanz-Pérez et al. (2019) recommend incorporating their management practices for farmland birds into agri-environment schemes, but we further propose that these simple practices should be guaranteed within the new CAP eco-schemes linked to the protection of fallows being included within conditionality. We briefly review the historical fallow loss; why the previous CAPs failed to preserve fallow land; and the opportunities that the new CAP offers to safeguard fallows in ways that bring maximum benefit for biodiversity conservation and promotion.

2 | THE CONTEMPORARY LOSS OF FALLOW LAND IN EUROPE

Since its inception in 1962, the European CAP has resulted in the intensification of agriculture to secure food production and market stability, often at the expense or neglect of environmental protection (Robson, 1997). The MacSharry reform of 1992 explicitly advocated the need for a more environmentally friendly European agriculture for the first time. This reform introduced the requirement that 15% of cultivated land be taken out of food production as a mandatory condition for farmers to receive direct income payments.

Although the European Commission acknowledged the benefits of set-aside land for farmland biodiversity, this measure was based on economic considerations and set-aside was phased out when markets no longer required constraints on crop production (Alons, 2017; European Commission, 2008). The fraction of arable land under mandatory set-aside was soon reduced to 10% in 1996 and later abolished in November 2008 through the CAP Health Check. These policy changes had immediate effects on the extent of European fallow land, which initially increased from 4.5 million ha in 1990 to 10.9 million ha in 1993 (Eurostat, 2019a) but then declined steadily after 2010 (31.9% decline between 2010 and 2017; Eurostat, 2019b). The generalized use of fertilizers and pesticides on productive land has probably contributed to the decline of fallow land area, as they reduced the need to leave land to rest to improve soil conditions and increase crop production.

Sanz-Pérez et al. (2019) carried out their study in Spain, the European country with the largest area of fallow land in Europe (51% of the total in 2017; Figure 1a) and which is also the main stronghold for many European farmland birds of significant conservation concern (Burfield, 2005). These include Montagu's Harrier *Circus pygargus*, Great and Little Bustards *Otis tarda* and *Tetrax tetrax*, Pin-tailed and Black-bellied Sandgrouse *Pterocles alchata* and *P. orientalis*, European Roller *Coracias garrulus* and several species of lark (Alaudidae). Spain exemplifies the key role that fallow maintenance and management play in the conservation of these farmland birds, currently in decline throughout Europe. In Spain, fallow area declined from more than 3.7 to 3.1 million ha between 2010 and 2017 (Eurostat, 2019b; Figure 1b). This progressive loss of fallows has recently been linked to the negative population trends of Spanish farmland birds (Traba & Morales, 2019) and threatens the viability of species of great conservation concern. For instance, male Little Bustard abundance declined dramatically by 48% during 2005–2016 in Spain, the main stronghold of this species in Europe (García de la Morena, Bota, Mañosa, & Morales, 2018). Conservation tools to promote the maintenance of fallow areas for biodiversity in the 2014–2020 CAP stopped the loss of fallows but were unable to recover the levels prior to the abolition of mandatory set-aside. A major cause of this failure is the way in which the European Commission implemented the ecological focus areas (EFA) initiative.

3 | PERVERSE EFFECT OF THE WEIGHTING SCORES OF EFAs ON FALLOWS AND BIODIVERSITY PROTECTION

The current 2014–2020 CAP introduced 'greening measures' in return for direct payments. Greening consists of three types of mandatory agricultural practices beneficial to the climate and environment (European Commission, 2013). Unlike environmental cross-compliance, farmers that comply with greening measures receive an extra payment as a reward for their role in delivering public goods and services beyond food production. One of the greening measures stipulates that farms with more than 15 ha of arable land must manage 5% of that land as an EFA, that is, a set of landscape elements including fallow land, to 'safeguard and improve biodiversity on farms' (European Commission, 2013). Each type of EFA was assigned a weighting factor according to its ecological value and implementation costs, to calculate its contribution to the required EFA area. Weighting scores ranged between 0.3 and 2 and the fallow land score has remained at one over successive CAP modifications.

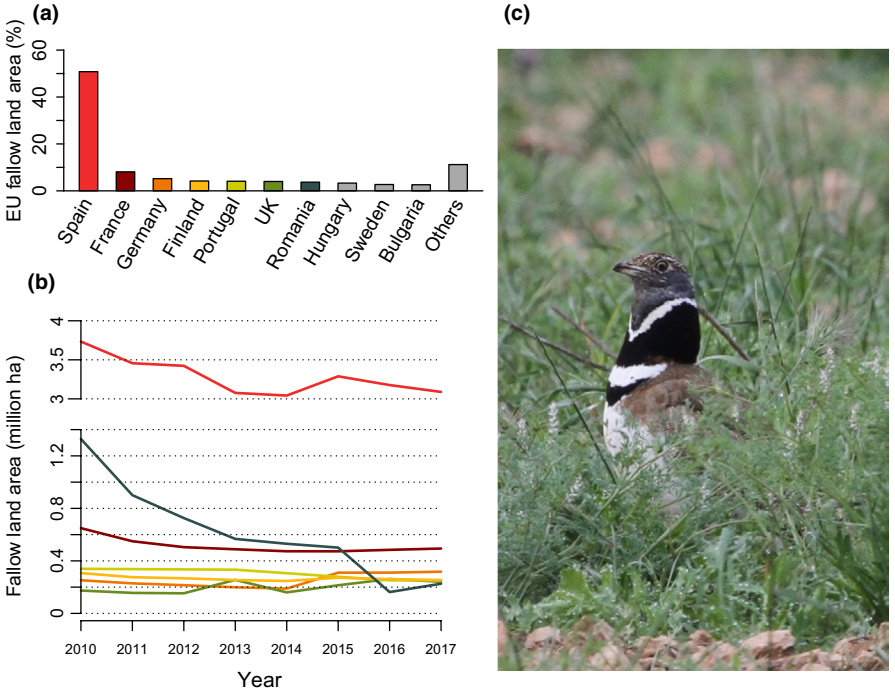

FIGURE 1 (a) Percentage of fallow land area in the European Member States in 2017. Grey bars represent Member States with <0.2 million ha of fallow land. (b) Yearly changes in fallow land area (2010–2017) in those countries with more than 0.2 million ha of fallow in 2017 (same colours as in panel a). (c) Male little bustard *Tetrax tetrax*, a fallow-dependent species that declined by 48% in Spain during 2005–2016. (photo by F. Mougeot)

The effectiveness of EFAs in enhancing farmland biodiversity has been questioned, largely due to the application and promotion of land uses with little effect on biodiversity and the complicated administrative burden involved (Navarro & López-Bao, 2018; Pe'er et al., 2014, 2017). Fallow land is one of the most crucial EFAs for farmland biodiversity according to experts (Pe'er et al., 2017), but only represented about 26% and 24% of the total EFA area in 2015 and 2016, respectively (Alliance Environnement, 2017). Farmers preferred productive options such as planting nitrogen-fixing and catch crops (a mixture of productive crops and/or grass species sown after a productive crop; Pe'er et al., 2017), which account for 71% and 73% of the total EFA area in 2015 and 2016, respectively (Alliance Environnement, 2017). Productive types of EFA are of doubtful value for the conservation of farmland biodiversity – their benefits are low or currently unknown (Pe'er et al., 2014, 2017). The European Commission has acknowledged this and has given the lowest weighting factors to productive EFAs, initially setting them at 0.3 for both nitrogen-fixing and catch crops (European Commission, 2014a).

There are several possible reasons why farmers were not attracted to fallow, one of the most biodiversity-friendly EFA. The European Commission allowed each Member State to select the number and type of EFAs included in their national lists. The Netherlands and Romania did not consider fallow as an EFA type, a fact that probably underlies the decline in their fallow land area in 2015 and 2016 (Alliance Environnement, 2017; though fallow land area slightly increased in Romania in 2017, Figure 1b). The European Commission also increased the weighting factor of productive EFAs, specifically for nitrogen-fixing crops. In April 2014, the European Commission published a declaration on delegated acts to increase the weighting factor for nitrogen-fixing crops from 0.3 to 0.7 to make this EFA type more attractive to farmers (https://ec.europa.eu/info/news/commission-declaration-delegated-acts-cap-reform-2014-apr-02_en). They justified this change by saying that it '…should also be seen within the context of the EU's strong dependence on imports of protein crops'. The reform of December 2017 introduced two new productive EFAs: *Silphium perfoliatum* and *Miscanthus* spp. crops (European Commission, 2017a). These species native to North America and Asia are perennial crops used for fodder and by the bioenergy sector (Bufe & Korevaar, 2018). *Miscanthus* spp. crops might offer shelter for insects as well as forest and scrub birds (but not for farmland birds), and limited food for insect pollinators (see in Bufe & Korevaar, 2018). However, its cultivation requires intensive use of herbicides that eliminate those weeds and wildflowers probably more relevant to native insects. The use of *Miscanthus* spp. might have additional negative effects if it becomes an invasive species, as has already been documented in America and The Netherlands (Bufe & Korevaar, 2018). Crops of *S. perfoliatum* seem to benefit generalist insects and soil fauna (see in Bufe & Korevaar, 2018). However, the use of *S. perfoliatum* by insects is highly dependent on the presence of natural vegetation and its suitability may decline with time as the crop structure homogenizes (Bufe & Korevaar, 2018). Therefore, these new EFA types have rather limited benefits to farmland biodiversity or may even have negative effects (Bufe & Korevaar, 2018; Navarro & Lopéz-Bao, 2018). Moreover, their incorporation forced the European Commission to revisit the weighting factors in a way that reflected their differing relevance to biodiversity conservation with regard to other EFAs. This resulted in a new increase in the weighting factor for nitrogen-fixing crops, whose score was raised to one (European Commission, 2017a). This unjustifiably put the benefits of fallows and nitrogen-fixing crops on the same level regarding improvements to farmland biodiversity, even though the scientific evidence and European Commission reports acknowledged the greater benefits of fallows over nitrogen-fixing crops (e.g. Underwood & Tucker, 2016). The European Commission's report reviewing the first year of the greening measures also recognized that nitrogen-fixing crops might have a negative effect on the environment due to the associated intensive practices (European Commission, 2016). Based on scientific evidence, it seems unrealistic that *S. perfoliatum*, *Miscanthus* spp. and nitrogen-fixing crops can equal the ecological impact of fallow land in protecting farmland biodiversity and promoting the reversal of farmland bird declines. With these policy changes, the European Commission has prioritized market and economic factors over environmental issues, even in measures specifically designed for protecting biodiversity.

4 | PESTICIDE USE AND FALLOWS

The CAP modification of February 2017 provided an important step forward for farmland biodiversity conservation – the ban on using phytosanitary products in EFAs (European Commission, 2017b). The widespread use of pesticides and herbicides in arable fields is one of the major drivers of population decline in farmland birds, acting directly on bird reproduction or survival, and indirectly by reducing the availability of food and suitable habitats (Geiger et al., 2010; Hallmann, Foppen, van Turnhout, de Kroon, & Jongejans, 2014; Lopez-Antia, Feliu, Camarero, Ortiz-Santaliestra, & Mateo, 2016). The use of these products on fallows to prevent excessive weed growth has been common practice but also decreases the quality of fallows as foraging or nesting sites for farmland birds (Vickery et al., 2004). The ban on using phytosanitary products on EFAs is certainly positive for biodiversity conservation but decades of abuse have contaminated soils beyond the areas of application and limit the benefits of fallows as EFAs for farmland birds (Humann-Guilleminot et al., 2019; Tarjuelo, Morales, Arribas, & Traba, 2019). Moreover, this ban risks exacerbating the conflict between agriculture and biodiversity conservation because herbicide use is one of the preferred means of weed control (Giralt et al., 2018). If farmers believe that unmanaged fallows allow weeds to grow out of control and reduce future crop production, they might take the risk of dodging compliance and applying prohibited phytosanitary products, given the low rate of on-field checks (European

Commission, 2014b). The work of Sanz-Pérez et al. (2019) is of great interest in this respect because their proposed management of fallow land could avoid the need to apply herbicides for weed control. By actively promoting extensive management of fallow land by tilling or shredding under the agricultural subsidy system, we could improve the acceptability of fallows among farmers.

5 | A NEW OPPORTUNITY TO CHANGE THE FALLOW PARADIGM

Negotiations for new CAP legislation are underway between the European Union and Member States, which opens up an extraordinary opportunity to overcome previous failures to address biodiversity challenges (Figure 2). The post-2020 CAP will adopt a new approach based on achieving nine objectives rather than meeting current requirements. One of these objectives is the preservation of landscapes, biodiversity and ecosystem services. The new CAP will merge cross-compliance and greening under a more demanding but simpler conditionality for direct payments (European Commission, 2019). Direct payments will also fund 'eco-schemes', a new tool for rewarding farmers who voluntarily adopt additional practices beneficial to the environment and climate on a yearly basis (European Commission, 2019). EFAs will be replaced by a new class of environmentally friendly practices – 'Good Agricultural and Environmental Conditions' (GAEC) – within a new conditionality. Biodiversity GAECs will only include non-productive land uses and areas suitable for maintaining biodiversity

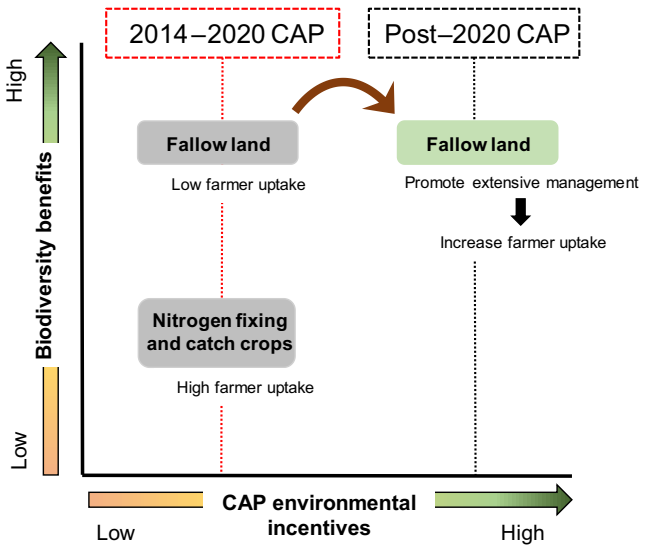

FIGURE 2 The 2014–2020 CAP failed to correctly match incentives for farmers with the biodiversity benefits of ecological focus area (EFA) types, resulting in a low farmer uptake of fallow land as EFA against productive EFA types, such as nitrogen-fixing and catch crops. The post-2020 must increase incentives for extensive fallow managements that benefit farmland birds and can increase farmers' uptake

(https://ec.europa.eu/info/news/environmental-care-and-climate-change-objectives-future-cap-2019-jan-25_en), and fallow land should be an important part of them.

Despite the failure of the CAP to make fallow land attractive to farmers, the area of fallow land has increased in those countries that made fallows available as EFAs (Alliance Environnement, 2017). It is time for the new post-2020 CAP to be more environmentally ambitious by considering which types of fallows are best for biodiversity conservation, given that management practices are key modulators of the effect that landscape features have on biodiversity (European Commission, 2017c; Sanz-Pérez et al., 2019; Tscharntke et al., 2011). Sanz-Pérez et al. (2019) proposed incorporating their management practices for farmland birds into agri-environment schemes (AES). AES can be profitable for both farmers and bird biodiversity, as shown in Spain with traditional crop rotation with fallow land (Oñate, Atance, Bardají, & Llusia, 2007). However, AES have had limited impact at regional or broader scales because of low farmer uptake (Kleijn & Sutherland, 2003), effects limited to farm- or field-scales (Concepción, Díaz, & Baquero, 2008) and deficient designs by governments (Llusia & Oñate, 2005). We therefore advocate that the simple practices proposed by Sanz-Pérez et al. (2019) should be integrated into the new eco-schemes and broadly applied to the total arable land area, in close association with conditionality on fallow land. Farmers might be more likely to change their attitude towards fallows if they are rewarded with incentives from direct payments for undertaking simple, easy practices which are both good for them and for the environment.

These management practices could be further extended to livestock production systems and applied to grasslands, which are also key landscapes for farmland biodiversity (Veen, Jefferson, de Smidt, & van der Straaten, 2009). Extensive livestock grazing of fallows is also desirable outside the breeding season because it creates a suitable herbaceous sward for farmland birds (Llusia & Oñate, 2005; Suárez, Naveso, & de Juana, 1997). However, studies on the optimal grazing levels are often lacking, preventing clear recommendations. In addition to the management recommendations advocated by Sanz-Pérez et al. (2019), we recommend leaving a fraction of fallow land unmanaged as part of eco-schemes, even for more than one season, to safeguard biodiversity components other than birds (e.g. Kuussaari et al., 2011; Toivonen, Herzon, & Kuussaari, 2015; Tscharntke et al., 2011).

The new CAP promises to be more flexible, allowing Member States to develop their own CAP strategic plans and to evaluate progress on the nine objectives, based on the yearly achievement of specific targets. Although this flexibility can be positive in achieving an agriculture better adapted to the particular conditions and needs of each country (Navarro & López-Bao, 2018), it can also generate important weaknesses. This model opens the door for countries to ignore practices such as preservation of fallow land or field margins (Pe'er et al., 2019), both proven to greatly benefit biodiversity in most agricultural landscapes. Although the European Commission gives the final approval to each Member State's CAP plan, we recommend that simple but highly beneficial

practices for biodiversity conservation need to be made statutory at the European level. Likewise, mechanisms for monitoring objective achievement should be established at the European level to ensure equal and high-level standards across Member States. It would be necessary to define suitable ecological indicators reflecting the improvement in biodiversity or ecosystem services arising from the environmental practices put in place. The effects of managements should be evaluated on particular species of conservation concern and using global measures, such as the farmland bird index, able to effectively document the health state and trends of bird communities (Traba & Morales, 2019). It would be equally necessary to set efficient control measures to ensure compliance on conditionality, as these are basic statutory requirements. The current 2014–2020 CAP required Member States to perform on-field checks on at least 1% of farms (European Commission, 2014b). Data made public by the Spanish Government from a survey on cross-compliance in 1.4% of agricultural farms in 2017 showed that 29.4% of farms did not comply with one or more mandatory requirements, 42.1% of non-compliance events being related to environmental issues (Fondo Español de Garantía Agraria, 2018). This highlights the fact that a large proportion of farmers had not complied with the minimum standards of cross-compliance and endorses the need for more ambitious control mechanisms to meet the new, stricter conditionality.

The new CAP should rectify the previously ambiguous descriptions of the norms regarding biodiversity conservation. One reason for farmers avoiding the EFAs most beneficial for biodiversity, such as landscape features, was that the complex requirements increased the risk of involuntary non-compliance and subsequent sanctions (European Commission, 2017c; Pe'er et al., 2017). The new CAP should use straightforward descriptions that avoid any ambiguities as to how the norms of environmental protection must be implemented in arable areas out of production. The current reference to fallow EFAs states that farmers '…should not exclude voluntary actions such as the seeding of wildflower mixtures with a view to improve the biodiversity benefits' (European Commission, 2014a). This unfairly leaves the decision as to what practices are (or are not) good for biodiversity to farmers. The European Commission or national administrations have to specify the rules clearly, based on the large body of existing scientific evidence. The communication of the scientific knowledge is equally important and should serve to inform farmers about the multiple benefits of extensive fallow management to maintain high fallow quality, maximize the benefits to biodiversity and ecosystem services and to improve compliance.

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AUTHORS' CONTRIBUTIONS

All authors conceived the ideas; R.T. led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

DATA AVAILABILITY STATEMENT

All data used in this paper have been extracted from public databases cited in the text.

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