

10 Recommendations for the establishment of sown flower-rich fields from a faunistic point of view

Sown flower-rich fields, fallows and set-asides have a key role for the conservation of biodiversity in the agricultural landscape (FLADE et al. 2003).

10.1 What sown flower-rich fields are able to accomplish

From a faunistic point of view sown flower-rich fields are a success story in Bavaria. They increase species diversity (number of species) and/or the abundance (number of individuals) of all animal groups investigated (Abb. 49). Against agricultural fields sown flower-rich fields show a higher

- biomass and abundance of earthworms (chapter 2),
- species diversity and abundance of arthropods (chapter 3),
- species diversity and abundance of birds and agricultural birds as well as species diversity of birds of the Bavarian Red List (chapter 5),
- species diversity and abundance of wintering birds (chapter 5),
- abundance of common hamsters (chapter 6),
- abundance of the European hare and roe deer (chapter 7).

Additionally sown flower-rich fields have effects on the surrounding landscape:

- Species diversity and abundance of arthropods are higher in fields close to sown flower-rich fields compared to distant fields (chapter 3).
- The abundance of pheasants and European hares in the agricultural landscape is higher in landscape with sown flower-rich fields compared to those without (chapter 8).
- An increased amount of sown flower-rich fields leads to a higher density of small game in the landscape (chapter 8).

Altogether 1,041 animal species have been mapped on sown flower-rich fields in Bavaria (chapter 3).

10.2 What sown flower-rich fields are unable to accomplish

The sown flower-rich fields only sometimes hold particularly rare species of insects, e.g. those depending on special wild herbs of agricultural fields or only occurring on nutrient-poor grasslands (chapter 3, chapter 4). Carabid beetles as typical examples of the epigeic arthropods are less frequent in sown flower-rich fields but tend to show a higher species diversity than in maize fields (chapter 4). Additionally, the high and dense vegetation structure of sown flower-rich fields are, at least during their third year, less attractive for birds of the open landscape such as sky larks or the blue-headed wagtail (chapter 5). Suitable measures for those species are perhaps annual natural succession, or certain measures integrated into production, such as uncultivated patches for skylarks or a double distance of seed rows including the avoidance of herbicides.

10.3 The ideal sown flower-rich field

Considerable demands are being made on sown flower-rich fields. Let alone from an agricultural point of view there are very diverse requirements. A sown flower-rich field in a project for the common hamster (chapter 6) can differ fundamentally from a sown flower-rich field optimised for pollinators (chapter 3).

Tab. 37: Characteristics of an ideal sown flower-rich field; the own results are printed bold, results from literature are printed regular, for details see the respective chapters

Characteristics	ideal conditions	annotiations	details
Seeds	species-rich, herbs, no grass species	hover flies (pollinators in general) benefit from the wealth of flowers	Chapter 3
Size	the bigger the better	the number of epigaeic arthropods, small game and birds increases depending of the size of the fields ; ideal size depending on the respective animal species	Chapter 4, Chapter 5, Chapter 7
Age	5-7 years (sown flower-rich fields have a 'date of expiry')	more earthworms after two years of soil rest time , usually more animal species on older sown flower-rich fields compared to new sites	Chapter 2, see below
Maintenance	no maintenance; during winter old structures should be left	demands of birds and small game (and insects); old vegetation structures for foraging and as cover, also important in winter	Chapter 5, Chapter 7, see below
Location	in intensive agricultural landscape	in poorly structured landscapes sown flower-rich fields have a stronger effect than in complex landscapes: small game, birds, pollinators	Chapter 5, Chapter 7, see below
Settlements	proximity positive	abundance all birds, abundance agricultural birds, pheasants	Chapter 5, Chapter 7
	proximity adverse	partridge	Chapter 5, Chapter 7
Traffic	proximity advers	European hare	Chapter 7
Forest	proximity positive	yellowhammer, European hare, roe deer	Chapter 5, Chapter 7
	proximity negative	species and abundance agricultural birds, pheasant, partridge	Chapter 5, Chapter 7

There is no individual ideal of a sown flower-rich field but there are several generally valid statements. Above all sown flower-rich fields should

- consist of seed material with a high amount of herbs,
- have a minimum size,
- be perennial,
- not be cultivated (Tab. 37).

10.4 Sown flower-rich fields in the context of the landscape

Sown flower-rich fields cannot be not be looked upon in isolation from the surrounding landscape. In simply structured and intensively used agricultural regions the effect of sown flower-rich fields is higher than in complex landscapes with many semi-natural habitats and ecologically enhanced sites. These findings are confirmed by own investigations on birds and small game (Tab. 37) and numerous external investigations, which have been summarised e.g. by SCHEPER et al. (2013) as well as by TSCHARNTKE et al. (2011). It should be the aim to establish sown flower-rich fields in all agricultural landscapes.

Although the individual sown flower-rich field in intensively used agricultural regions is very effective, landscapes with few sown flower-rich fields and other ecological priority zones have an impoverished fauna compared to landscapes with numerous ecological priority zones. Regarding small game this effect could be proven for the fertile landscape region of the 'Gäulagen' in Lower Bavaria, with the number of small game increasing after establishing additional sown flower-rich fields (chapter 8). There should be a minimum amount of such sites in the agricultural landscape. There is a broad agreement that the agricultural landscape should include about 10 % of - depending on the author - near-natural structures, ecologically and culturally important sites or ecological priority zones in order to maintain biodiversity and the functional capability of ecology and regional culture (Flade et al. 2003, Guntern et al. 2013, Herzog & Walter 2005, IAB-LfL 2013, Umweltbundesamt 2010). Herzog and Walter (2005) require at least five percent of ecologically valuable compensation sites in order to promote the European hare in the agricultural landscape in Switzerland.

Sown flower-rich fields are not an adequate compensation for other ecological priority sites such as hedgerows, copses, extensively used grasslands and other permanent structures. They however are a very important component for the establishment of an agricultural landscape with a high diversity of species.

Generally, sown flower-rich fields should be maintained as long as possible. Earthworms react with a temporal delay on the soil rest (chapter 2). The frequency of predatory arthropods such as spiders, and generally of all hibernating insects increases over the years. From this point of view "the older" means "the better" (Van Buskirk & Willi 2004, Denys & Tschardtke 2002). The ideal age though for sown flower-rich fields is assumed to be five to seven years, owing to the fact that increasing vegetation succession leads to the development of dominant stands and to a reduction of species diversity. This leads to a decrease of flower-visiting insects (Tschardtke et al. 2011).

Whenever possible the mowing or mulching of sown flower-rich fields should be avoided. Dead vegetation with its structures has become rare in the agricultural landscape. Meadows, slopes and margins are mowed or mulched in autumn as "preparation for the winter".

This measure destroys structures required by wintering or foraging birds, small game as a cover or for insects hibernating above ground for their survival.

For the common whitethroat, for example, the old plant stands of the previous year are indispensable components for its breeding habitat. The added value of an unmown sown flower-rich field should necessarily be maintained. In some cases it might improve biodiversity for larger fields to mow the site in sections; this supports less competitive herbs, and the flower aspect comes to the fore again.