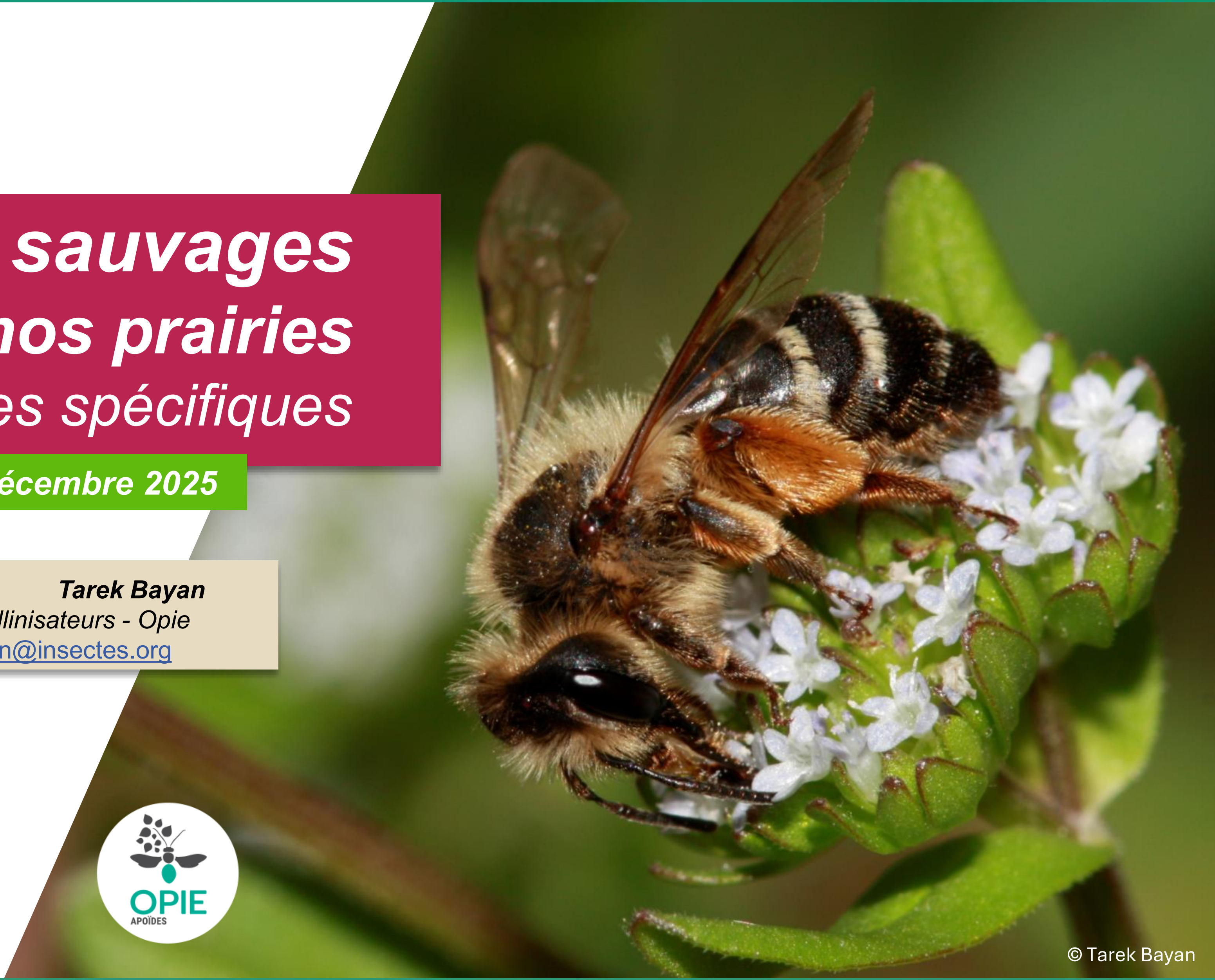
Webinaire : les prairies fleuries

Les abeilles sauvages au sein de nos prairies

Cortèges et ressources spécifiques

12 décembre 2025

Tarek Bayan
Chargé de mission insectes pollinisateurs - Opie
tarek.bayan@insectes.org



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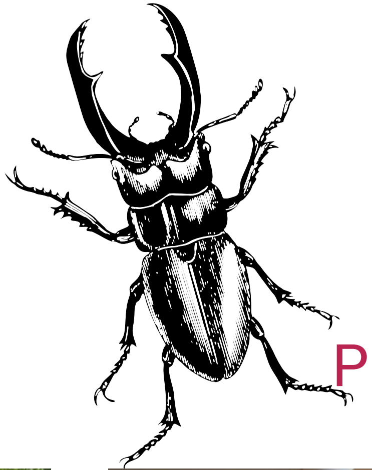
OPIE APOÏDES

Office pour les insectes et leur environnement

Association nationale de protection de la nature spécialiste des insectes

Expertise

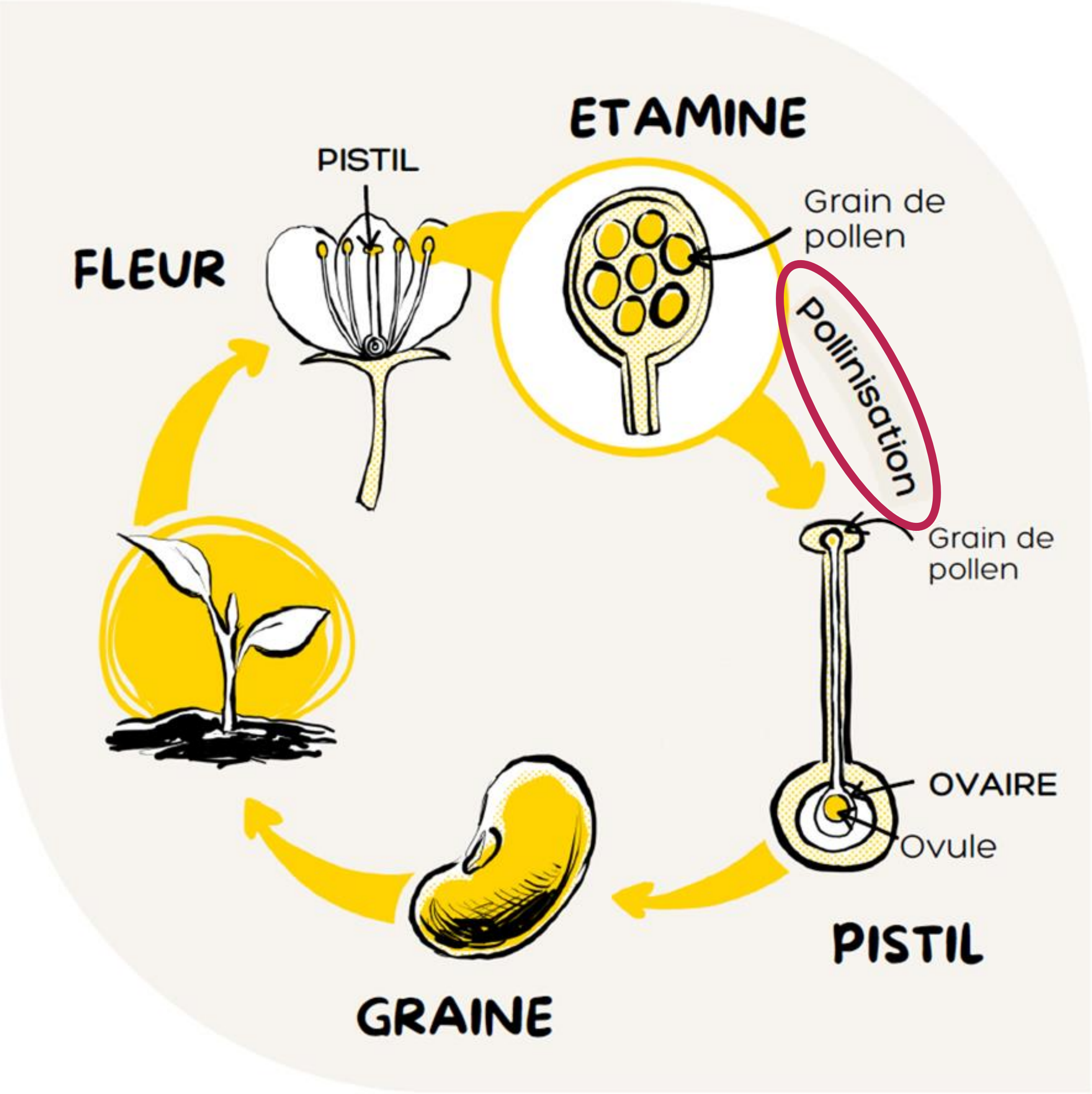
& Préservation des insectes



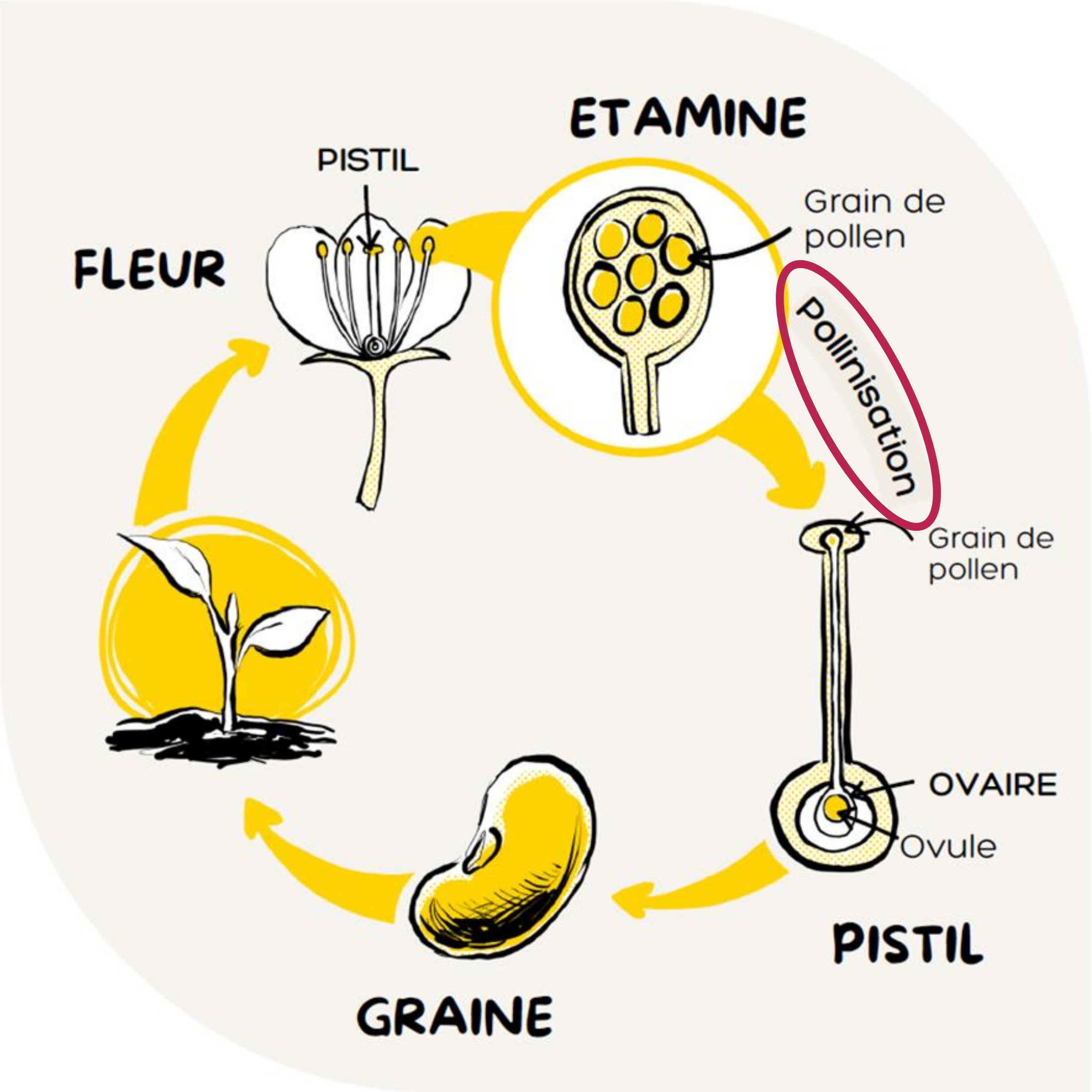
Éducation

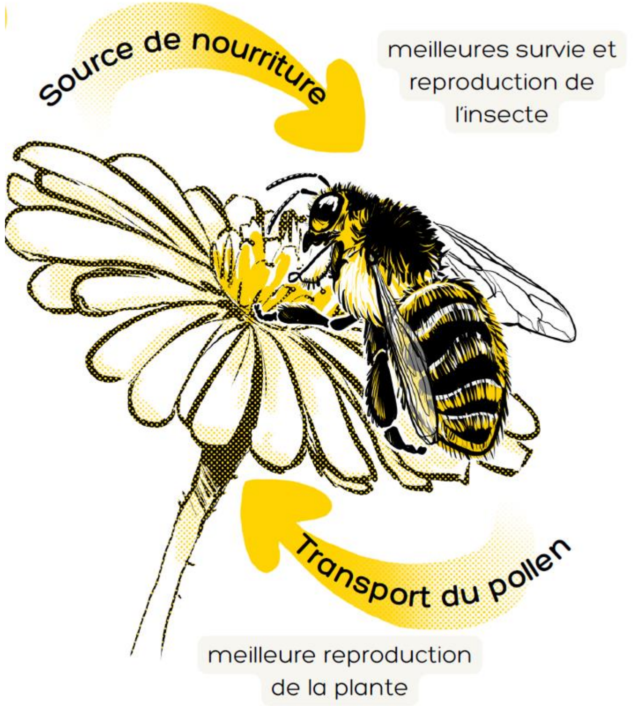
Partage connaissance & formation

La pollinisation



La pollinisation





Bénéfice réciproque

Les pollinisateurs c’est …

4 ordres principaux d’insectes :

Coléoptères

Diptères

Hyménoptères

Lépidoptères

Les pollinisateurs c'est …

4 ordres principaux d'insectes :

Coléoptères

Diptères

abeilles

Hyménoptères

Lépidoptères

Les abeilles c’est …

Apis mellifera

Ruche, reine, miel, …

Les abeilles c'est … une grande diversité

Les abeilles sauvages

Diversité

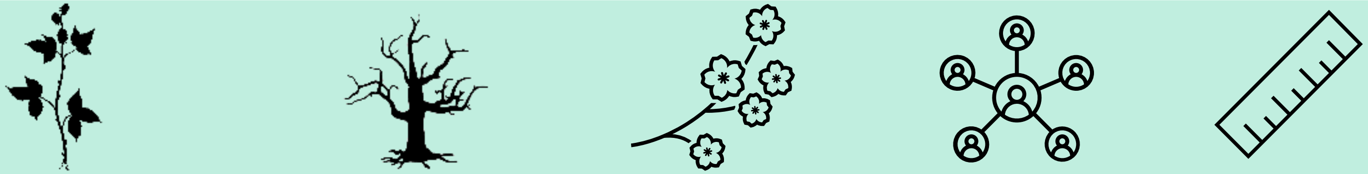
Les abeilles c’est :

près de **2 000 espèces** en Europe

près de **1 000 espèces** en France

6 familles présentes en France

Une diversité en **traits de vie**



Les communautés d’abeilles sauvages


OPIE
OFFICE POUR LES INSECTES ET LEUR ENVIRONNEMENT

Programme d’actions inter-Parcs naturels régionaux franciliens en faveur des insectes pollinisateurs sauvages

Bilan

Novembre 2024

îledeFrance

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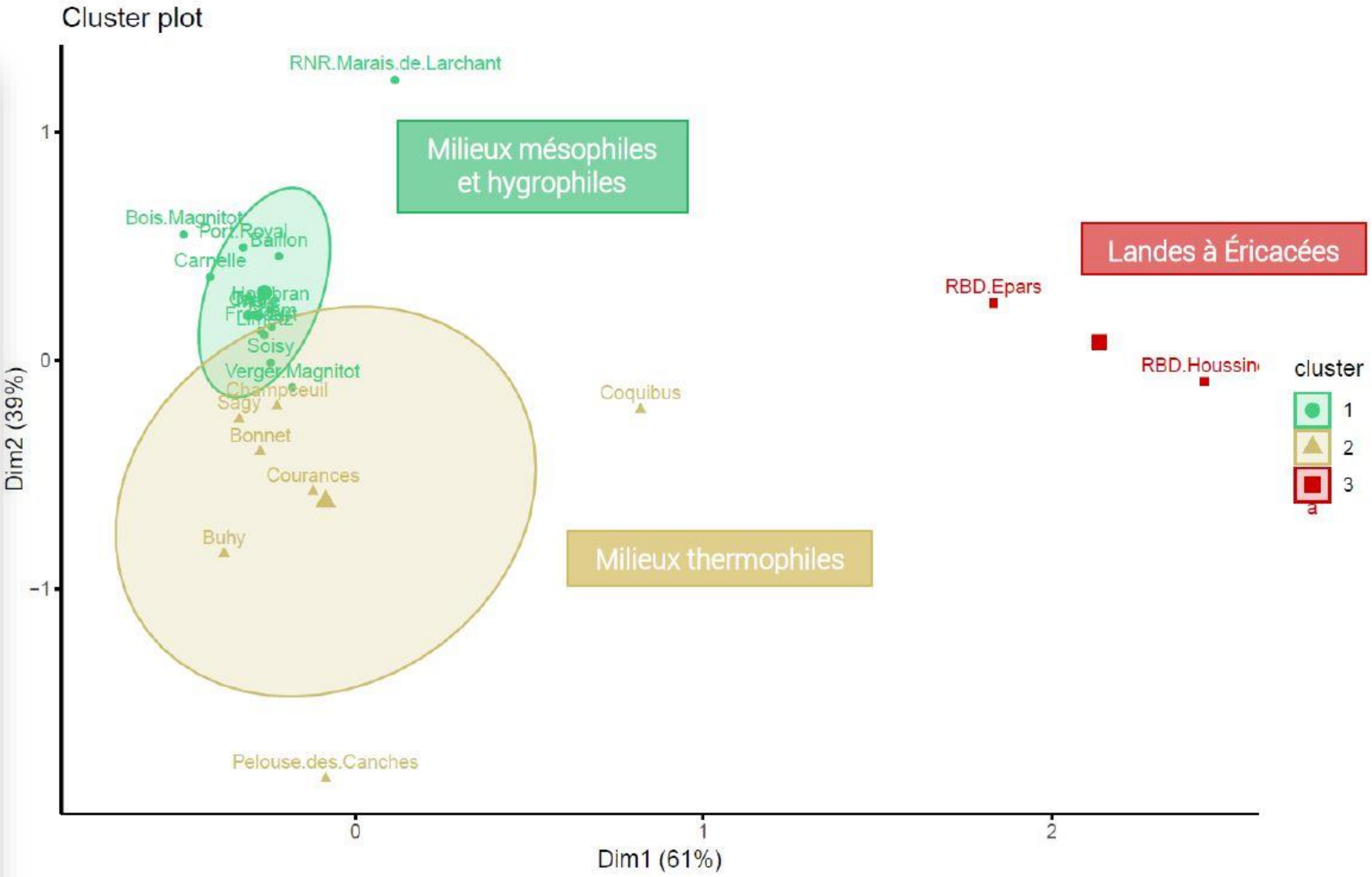
Parc naturel régional du Vexin français
Parc naturel régional du Gâtinais français
Parc naturel régional Oise - Pays de France
Parc naturel régional de la Haute Vallée de Chevreuse



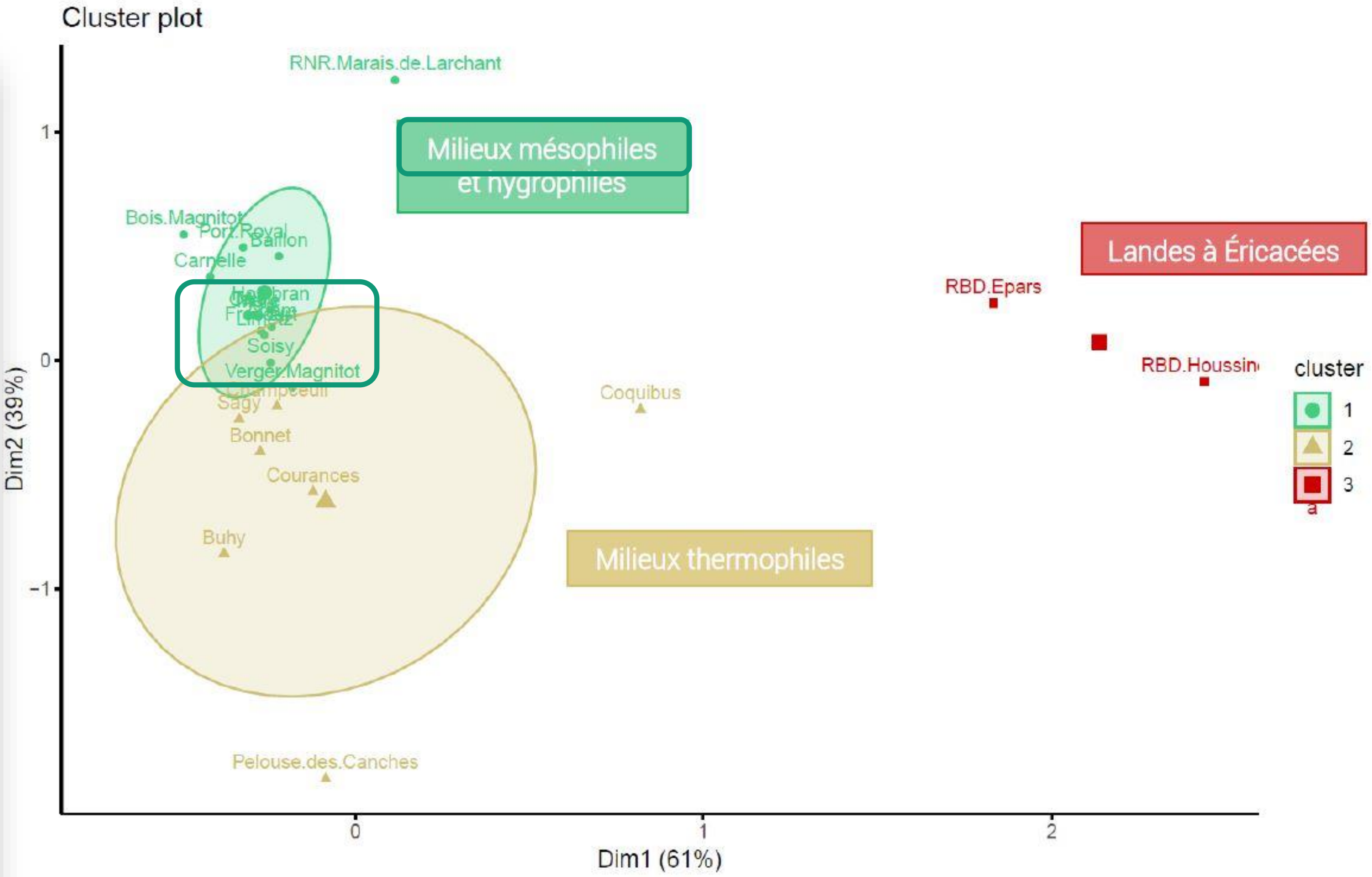
Abeilles et prairies mésophiles


OPIE
OFFICE POUR LES INSECTES ET LEUR ENVIRONNEMENT

Programme d'actions inter-Parcs naturels régionaux franciliens en faveur des insectes pollinisateurs sauvages

Bilan

Novembre 2024



Cas des prairies mésophiles

Des abeilles spécialisées

Chelostoma florisomne

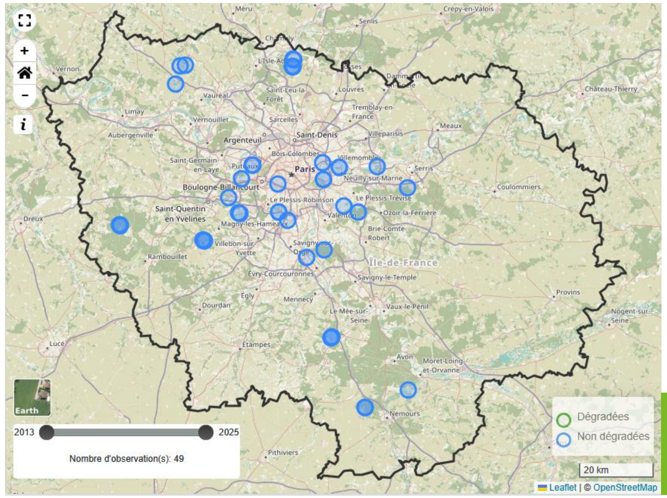
M	A	M	J	J	A	S

Spécialiste (pollen)

Terricole

Ranunculus acris

Ranunculaceae



Biodiv'îdF

Des abeilles spécialisées

Andrena hattorfiana

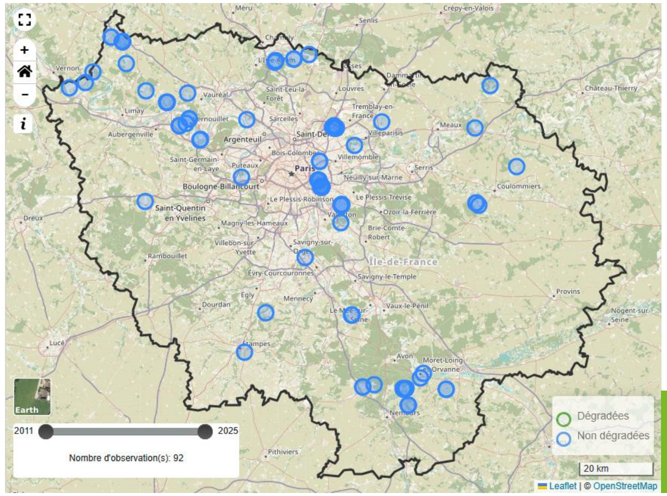
M	A	M	J	J	A	S

Spécialiste (pollen)

Terricole

Knautia arvensis

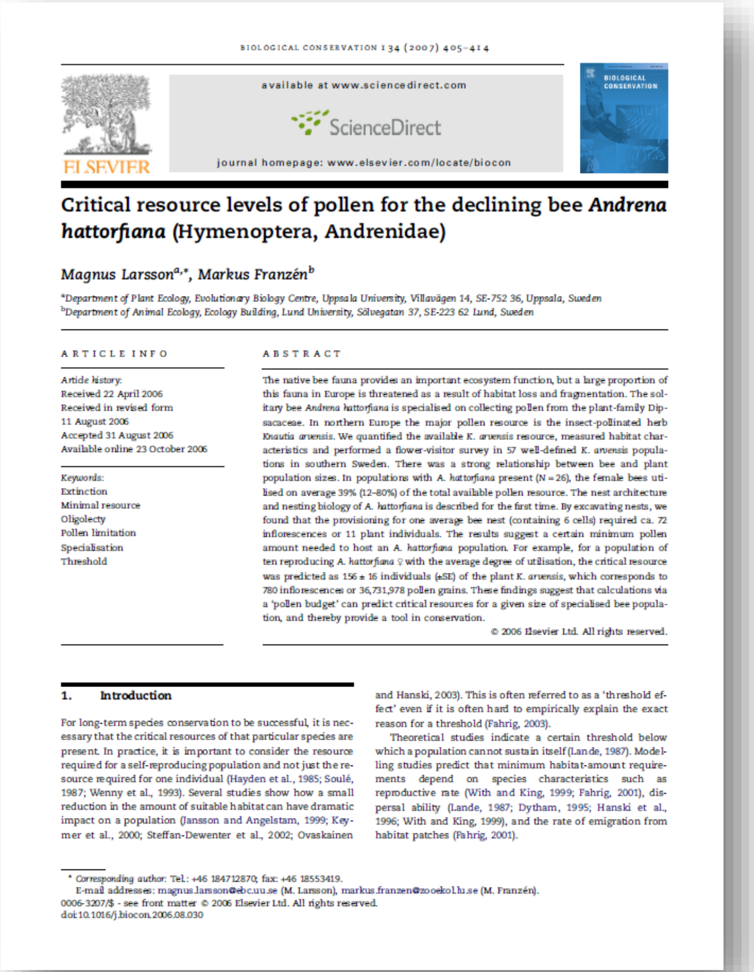
Caprifoliaceae



Biodiv'îdF

Des abeilles spécialisées

Andrena hattorfiana



BIOLOGICAL CONSERVATION 134 (2007) 405–414

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journal homepage: www.elsevier.com/locate/biocon

Critical resource levels of pollen for the declining bee *Andrena hattorfiana* (Hymenoptera, Andrenidae)

Magnus Larsson[a,*], *Markus Franzén*[b]

[a]*Department of Plant Ecology, Evolutionary Biology Centre, Uppsala University, Villavägen 14, SE-752 36, Uppsala, Sweden*
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A R T I C L E I N F O

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Keywords:
Extinction
Minimal resource
Oligolecty
Pollen limitation
Specialisation
Threshold

A B S T R A C T

The native bee fauna provides an important ecosystem function, but a large proportion of this fauna in Europe is threatened as a result of habitat loss and fragmentation. The solitary bee *Andrena hattorfiana* is specialised on collecting pollen from the plant-family Dipsacaceae. In northern Europe the major pollen resource is the insect-pollinated herb *Knautia arvensis*. We quantified the available *K. arvensis* resource, measured habitat characteristics and performed a flower-visitor survey in 57 well-defined *K. arvensis* populations in southern Sweden. There was a strong relationship between bee and plant population sizes. In populations with *A. hattorfiana* present ($N = 26$), the female bees utilised on average 39% (12–80%) of the total available pollen resource. The nest architecture and nesting biology of *A. hattorfiana* is described for the first time. By excavating nests, we found that the provisioning for one average bee nest (containing 6 cells) required ca. 72 inflorescences or 11 plant individuals. The results suggest a certain minimum pollen amount needed to host an *A. hattorfiana* population. For example, for a population of ten reproducing *A. hattorfiana* ♀ with the average degree of utilisation, the critical resource was predicted as 156 ± 16 individuals (±SE) of the plant *K. arvensis*, which corresponds to 780 inflorescences or 36,731,978 pollen grains. These findings suggest that calculations via a 'pollen budget' can predict critical resources for a given size of specialised bee population, and thereby provide a tool in conservation.

1. Introduction

For long-term species conservation to be successful, it is necessary that the critical resources of that particular species are present. In practice, it is important to consider the resource required for a self-reproducing population and not just the resource required for one individual (Hayden et al., 1985; Soulé, 1987; Wenny et al., 1993). Several studies show how a small reduction in the amount of suitable habitat can have dramatic impact on a population (Jansson and Angelstam, 1999; Keymer et al., 2000; Steffan-Dewenter et al., 2002; Ovaskainen and Hanski, 2003). This is often referred to as a 'threshold effect' even if it is often hard to empirically explain the exact reason for a threshold (Fahrig, 2003).

Theoretical studies indicate a certain threshold below which a population can not sustain itself (Lande, 1987). Modelling studies predict that minimum habitat-amount requirements depend on species characteristics such as reproductive rate (With and King, 1999; Fahrig, 2001), dispersal ability (Lande, 1987; Dytham, 1995; Hanski et al., 1996; With and King, 1999), and the rate of emigration from habitat patches (Fahrig, 2001).

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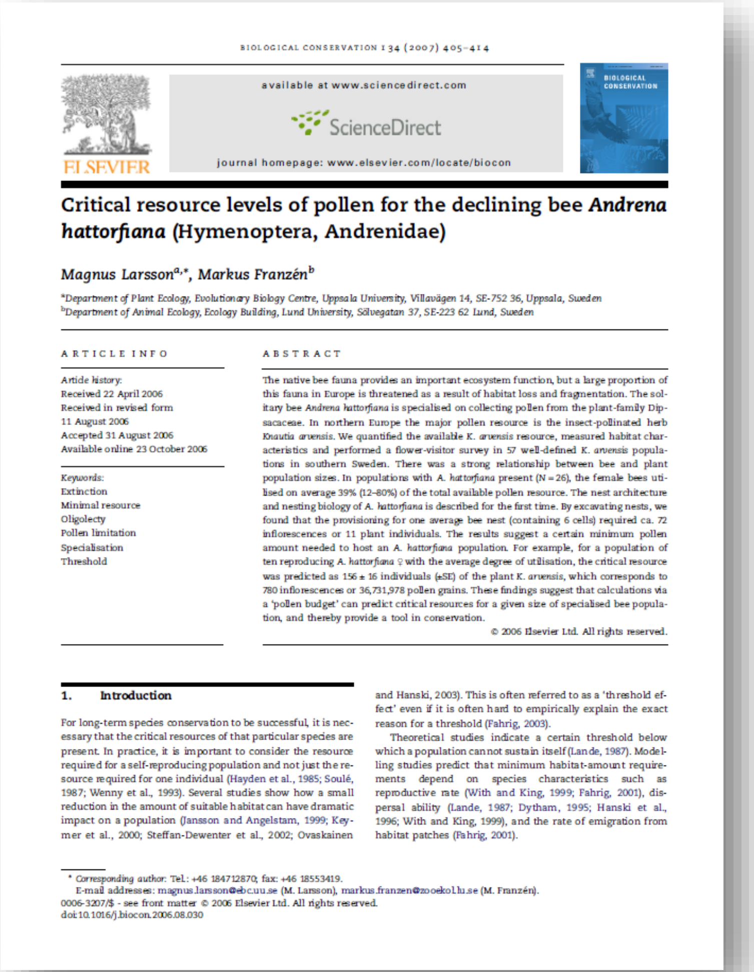
E-mail addresses: magnus.larsson@ebc.uu.se (M. Larsson), markus.franzen@zooekol.lu.se (M. Franzén).
0006-3207/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.biocon.2006.08.030

« *Notre étude montre que la présence et la taille des populations* d'A. hattorfiana *peuvent être fortement corrélées à la ressource pollinique disponible […] la ressource pollinique critique pour 10 reproductrices* d'A. hattorfiana *variait de 27 à 361 individus végétaux.* »

Des abeilles spécialisées

Andrena hattorfiana



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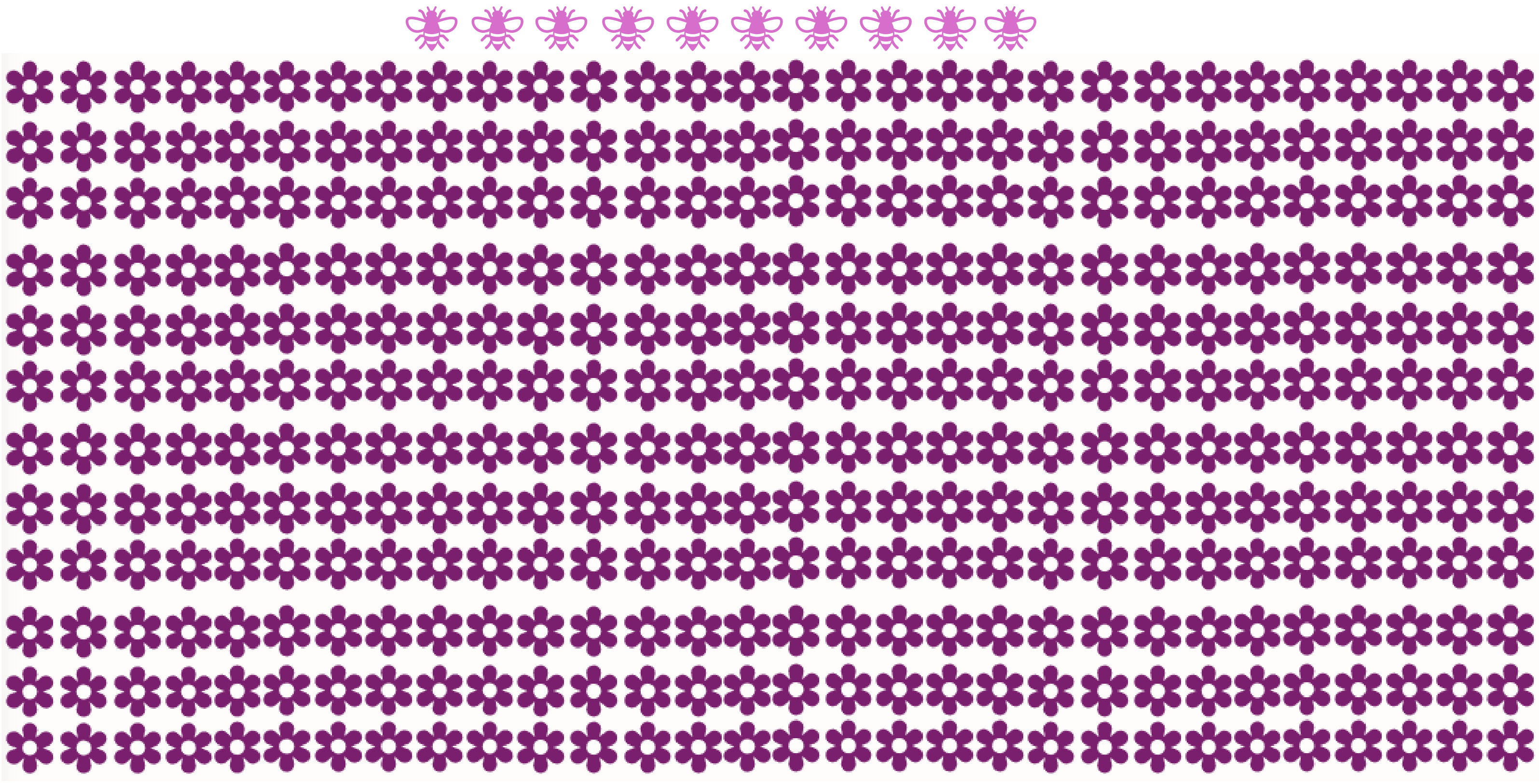


Des abeilles spécialisées

Cas des espèces spécialisées sur les campanules

M A M J J A S

Campanula rapunculus

Campanulaceae

Andrena pandellei

Chelostoma campanularum

Des abeilles spécialisées

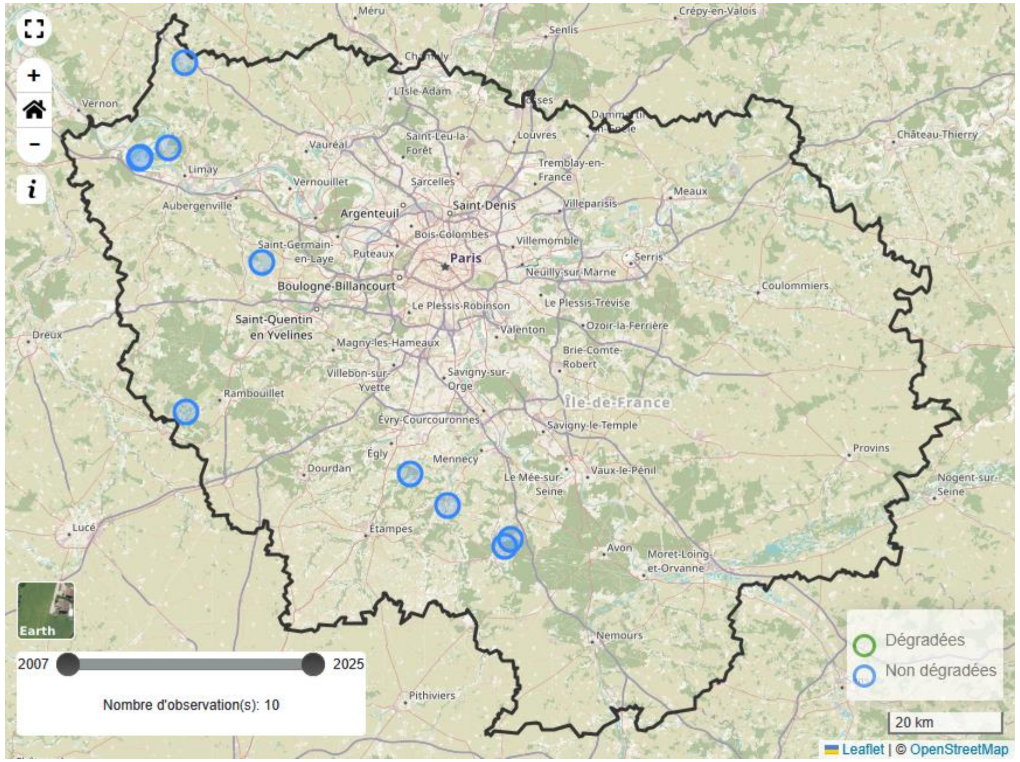
Cas des espèces spécialisées sur les campanules

M	A	M	J	J	A	S

Campanula rapunculus

Campanulaceae

Lasioglossum costulatum



Biodiv'îdF

znieff

NT

Une prairie oui, mais laquelle ?

Laisser la flore spontanée se développer !

Banque de graine dans le sol ?

Une prairie oui, mais laquelle ?

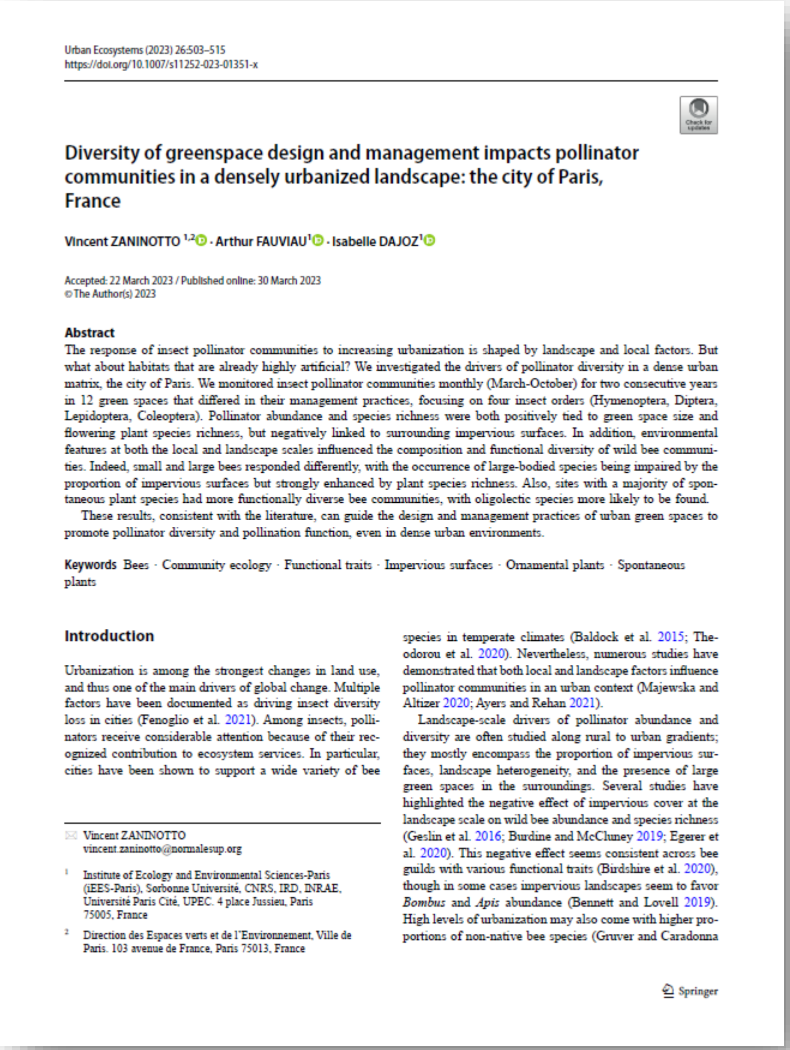
Laisser la flore spontanée se développer !

Banque de graine dans le sol ?

Sinon…
Quelles espèces de plantes semer ?

Une prairie oui, mais laquelle ?

Bien choisir son semis (diversité)


Urban Ecosystems (2023) 26:503–515
https://doi.org/10.1007/s11252-023-01351-x

Diversity of greenspace design and management impacts pollinator communities in a densely urbanized landscape: the city of Paris, France

Vincent ZANINOTTO [1,2] · Arthur FAUVIAU [1] · Isabelle DAJOZ [1]

Accepted: 22 March 2023 / Published online: 30 March 2023

Abstract
The response of insect pollinator communities to increasing urbanization is shaped by landscape and local factors. But what about habitats that are already highly artificial? We investigated the drivers of pollinator diversity in a dense urban matrix, the city of Paris. We monitored insect pollinator communities monthly (March-October) for two consecutive years in 12 green spaces that differed in their management practices, focusing on four insect orders (Hymenoptera, Diptera, Lepidoptera, Coleoptera). Pollinator abundance and species richness were both positively tied to green space size and flowering plant species richness, but negatively linked to surrounding impervious surfaces. In addition, environmental features at both the local and landscape scales influenced the composition and functional diversity of wild bee communities. Indeed, small and large bees responded differently, with the occurrence of large-bodied species being impaired by the proportion of impervious surfaces but strongly enhanced by plant species richness. Also, sites with a majority of spontaneous plant species had more functionally diverse bee communities, with oligolectic species more likely to be found.

These results, consistent with the literature, can guide the design and management practices of urban green spaces to promote pollinator diversity and pollination function, even in dense urban environments.

Keywords Bees · Community ecology · Functional traits · Impervious surfaces · Ornamental plants · Spontaneous plants

Introduction

Urbanization is among the strongest changes in land use, and thus one of the main drivers of global change. Multiple factors have been documented as driving insect diversity loss in cities (Fenoglio et al. 2021). Among insects, pollinators receive considerable attention because of their recognized contribution to ecosystem services. In particular, cities have been shown to support a wide variety of bee species in temperate climates (Baldock et al. 2015; Theodorou et al. 2020). Nevertheless, numerous studies have demonstrated that both local and landscape factors influence pollinator communities in an urban context (Majewska and Altizer 2020; Ayers and Rehan 2021).

Landscape-scale drivers of pollinator abundance and diversity are often studied along rural to urban gradients; they mostly encompass the proportion of impervious surfaces, landscape heterogeneity, and the presence of large green spaces in the surroundings. Several studies have highlighted the negative effect of impervious cover at the landscape scale on wild bee abundance and species richness (Geslin et al. 2016; Burdine and McCluney 2019; Egerer et al. 2020). This negative effect seems consistent across bee guilds with various functional traits (Birdshire et al. 2020), though in some cases impervious landscapes seem to favor *Bombus* and *Apis* abundance (Bennett and Lovell 2019). High levels of urbanization may also come with higher proportions of non-native bee species (Gruver and Caradonna

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1 Institute of Ecology and Environmental Sciences-Paris (iEES-Paris), Sorbonne Université, CNRS, IRD, INRAE, Université Paris Cité, UPEC. 4 place Jussieu, Paris 75005, France

2 Direction des Espaces verts et de l'Environnement, Ville de Paris. 103 avenue de France, Paris 75013, France

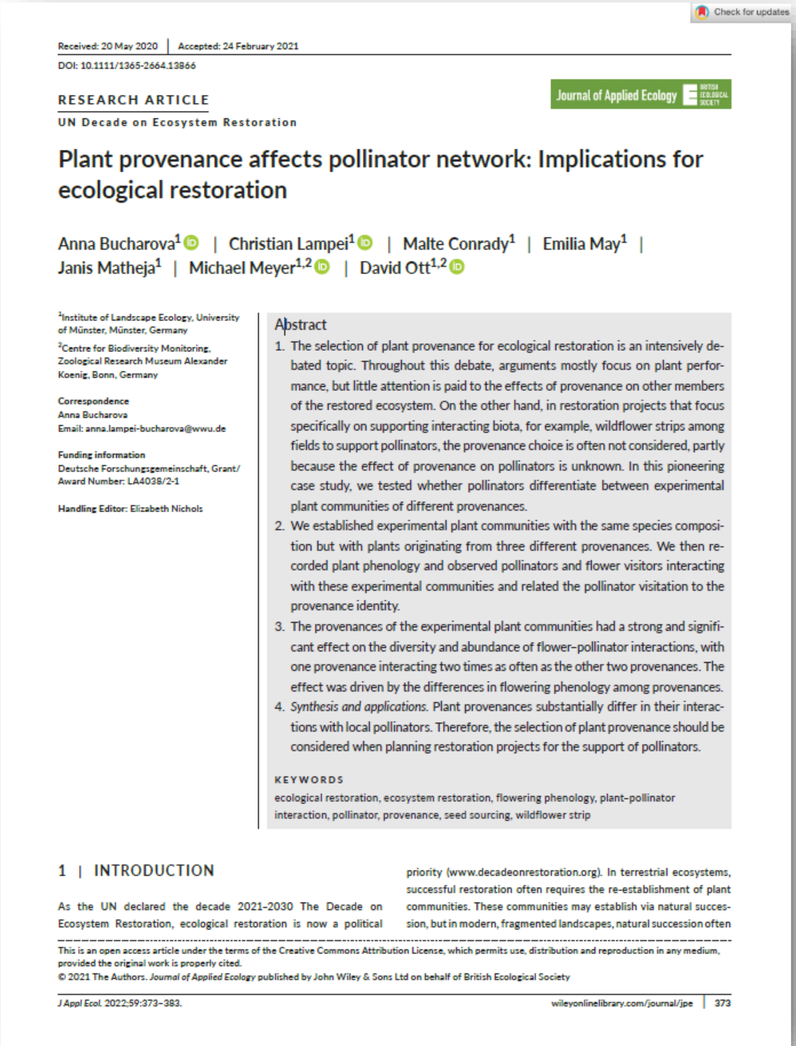
« L'abondance des pollinisateurs et la richesse des espèces étaient toutes deux liées positivement à la taille des espaces verts et à la richesse des espèces de plantes à fleurs, mais liées négativement aux surfaces imperméables environnantes. »

Semis

diversité

Une prairie oui, mais laquelle ?

Bien choisir son semis (provenance)



Check for updates

Received: 20 May 2020 | Accepted: 24 February 2021

DOI: 10.1111/1365-2664.13866

RESEARCH ARTICLE

UN Decade on Ecosystem Restoration

Journal of Applied Ecology

Plant provenance affects pollinator network: Implications for ecological restoration

Anna Bucharova[1] | Christian Lampei[1] | Malte Conrady[1] | Emilia May[1] | Janis Matheja[1] | Michael Meyer[1,2] | David Ott[1,2]

[1]Institute of Landscape Ecology, University of Münster, Münster, Germany

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Funding information
Deutsche Forschungsgemeinschaft, Grant/Award Number: LA4038/2-1

Handling Editor: Elizabeth Nichols

Abstract

1. The selection of plant provenance for ecological restoration is an intensively debated topic. Throughout this debate, arguments mostly focus on plant performance, but little attention is paid to the effects of provenance on other members of the restored ecosystem. On the other hand, in restoration projects that focus specifically on supporting interacting biota, for example, wildflower strips among fields to support pollinators, the provenance choice is often not considered, partly because the effect of provenance on pollinators is unknown. In this pioneering case study, we tested whether pollinators differentiate between experimental plant communities of different provenances.
2. We established experimental plant communities with the same species composition but with plants originating from three different provenances. We then recorded plant phenology and observed pollinators and flower visitors interacting with these experimental communities and related the pollinator visitation to the provenance identity.
3. The provenances of the experimental plant communities had a strong and significant effect on the diversity and abundance of flower–pollinator interactions, with one provenance interacting two times as often as the other two provenances. The effect was driven by the differences in flowering phenology among provenances.
4. *Synthesis and applications.* Plant provenances substantially differ in their interactions with local pollinators. Therefore, the selection of plant provenance should be considered when planning restoration projects for the support of pollinators.

KEYWORDS

ecological restoration, ecosystem restoration, flowering phenology, plant–pollinator interaction, pollinator, provenance, seed sourcing, wildflower strip

1 | INTRODUCTION

As the UN declared the decade 2021-2030 The Decade on Ecosystem Restoration, ecological restoration is now a political priority (www.decadeonrestoration.org). In terrestrial ecosystems, successful restoration often requires the re-establishment of plant communities. These communities may establish via natural succession, but in modern, fragmented landscapes, natural succession often

« Les provenances des communautés végétales expérimentales ont eu un effet fort et significatif sur la diversité et l'abondance des interactions fleurs-pollinisateurs , une provenance interagissant deux fois plus souvent que les deux autres provenances.

Semis

diversité

provenance

Une prairie oui, mais laquelle ?

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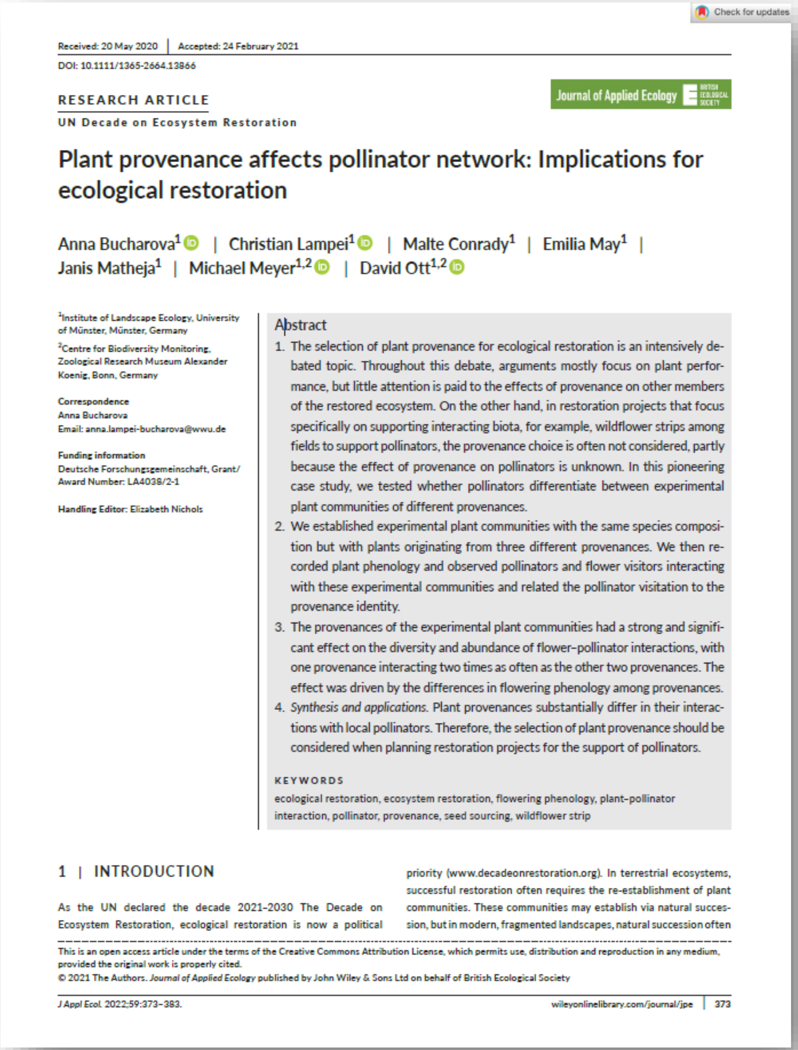
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RESEARCH ARTICLE
UN Decade on Ecosystem Restoration

Journal of Applied Ecology — British Ecological Society

Plant provenance affects pollinator network: Implications for ecological restoration

Anna Bucharova[1] | Christian Lampei[1] | Malte Conrady[1] | Emilia May[1] | Janis Matheja[1] | Michael Meyer[1,2] | David Ott[1,2]

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Cet effet était dû aux différences de phénologie de floraison entre les provenances. »

Semis

diversité

provenance

phénologie

Une prairie oui, mais laquelle ?

Décalage phénologique et dérèglement climatique ?

Ecology Letters, (2007) 10: 710–717 doi: 10.1111/j.1461-0248.2007.01061.x

LETTER

Global warming and the disruption of plant–pollinator interactions

Jane Memmott,[1]* Paul G. Craze,[1] Nickolas M. Waser[2] and Mary V. Price[2]
[1]School of Biological Sciences, University of Bristol, Bristol BS8 1UG, UK
[2]School of Natural Resources, University of Arizona, Tucson, AZ 85721, USA
*Correspondence: E-mail: jane.memmott@bristol.ac.uk

Abstract
Anthropogenic climate change is widely expected to drive species extinct by hampering individual survival and reproduction, by reducing the amount and accessibility of suitable habitat, or by eliminating other organisms that are essential to the species in question. Less well appreciated is the likelihood that climate change will directly disrupt or eliminate mutually beneficial (mutualistic) ecological interactions between species even before extinctions occur. We explored the potential disruption of a ubiquitous mutualistic interaction of terrestrial habitats, that between plants and their animal pollinators, via climate change. We used a highly resolved empirical network of interactions between 1420 pollinator and 429 plant species to simulate consequences of the phenological shifts that can be expected with a doubling of atmospheric CO_2. Depending on model assumptions, phenological shifts reduced the floral resources available to 17–50% of all pollinator species, causing as much as half of the ancestral activity period of the animals to fall at times when no food plants were available. Reduced overlap between plants and pollinators also decreased diet breadth of the pollinators. The predicted result of these disruptions is the extinction of pollinators, plants and their crucial interactions.

Keywords
Climate, insects, network, phenology, plants, pollination.

Ecology Letters (2007) 10: 710–717

INTRODUCTION

Pollination of flowers is an essential step in the sexual reproduction of angiosperms. Most angiosperm species rely on insects or other animals, rather than wind, for transfer of pollen among individual plants. The pollinators in turn benefit by obtaining floral resources such as nectar or pollen. Pollination is not only mutually beneficial to the interacting plants and animals, but also serves humanity directly through the yield of many crops, and indirectly by contributing to the healthy functioning of unmanaged terrestrial ecosystems (Costanza et al. 1997; Nabhan & Buchmann 1997; Klein et al. 2007). Unfortunately, plant and pollinator species are increasingly at risk of local and global extinction from human activities, including habitat loss, altered land use, introduction of alien species and climate change (Kearns et al. 1998; Biesmeijer et al. 2006). Furthermore, some anthropogenic changes directly threaten pollination interactions themselves. The most obvious example is climate change, which may disrupt the overlap in seasonal timing (i.e. phenology) of flower production and of pollinator flight activity, thus altering the opportunity for interaction between the plants and animals (e.g. Harrison 2000; Wall et al. 2003).

The major aspect of climate change, increase in mean global temperature, is associated with an average advancement in the phenology of life history events, including migration and reproduction, in many species. Plants and their pollinators appear to follow this pattern. Over the past century, global warming has advanced the first flowering date of plants, and the seasonal flight activity of some pollinating insects, by c. 4 days per degree C on average in temperate zones (see Methods). However, the responses of individual species vary around these averages, so that while most phenologies have been advanced, the degree of advancement has varied, and some phenologies have remained essentially unchanged or have even been retarded.

Our aim in this paper was to explore how future climate change, from the doubling of atmospheric CO_2

«Selon les hypothèses du modèle, les changements phénologiques ont réduit les ressources florales disponibles à 17-50 % pour toutes les espèces pollinisatrices, […] Le résultat prévu de ces perturbations est l'extinction des pollinisateurs, des plantes et de leurs interactions cruciales. »

Semis

diversité

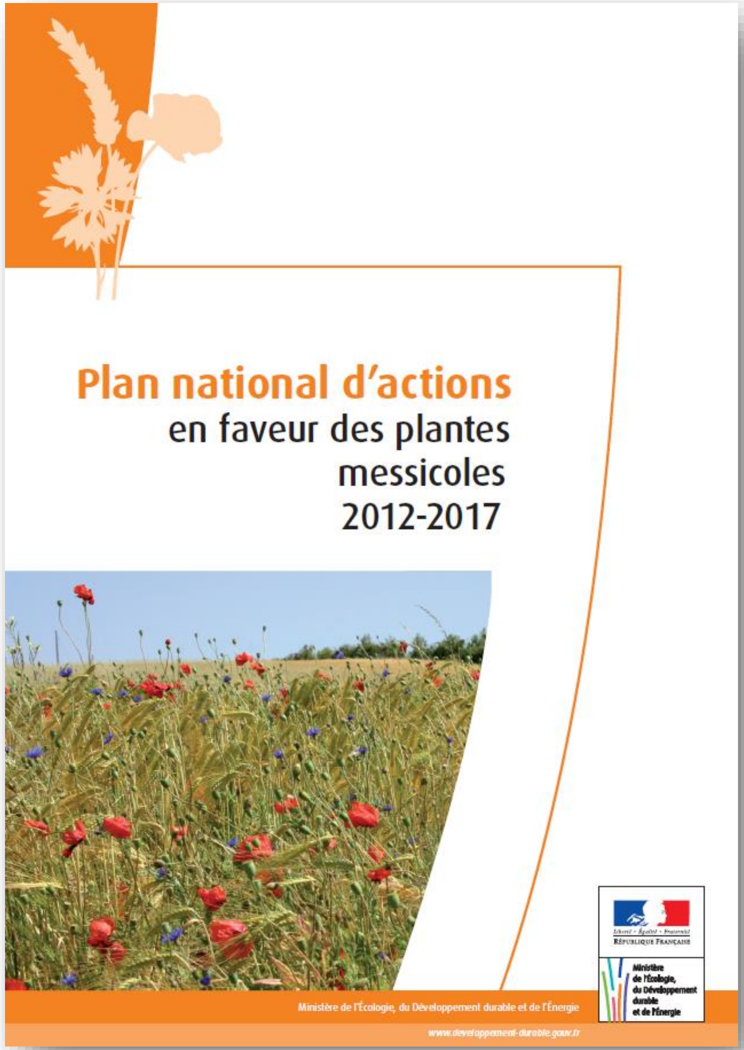
provenance

phénologie

dérèglement climat.

Une prairie oui, mais laquelle ?

Horticoles et cultivars ?



Cas du Bleuet : « *Les fleurs horticoles présentent des corolles doubles ou multiples de couleurs diverses (blanc, rose, mauve, bleu) alors que le phénotype sauvage est à corolle simple, d'un bleu profond. La formation des fleurons surnuméraires s'est faite au dépend des fleurs centrales fertiles, les variétés sélectionnées perdant ainsi leur rôle nutritif pour les pollinisateurs et autres insectes.* »

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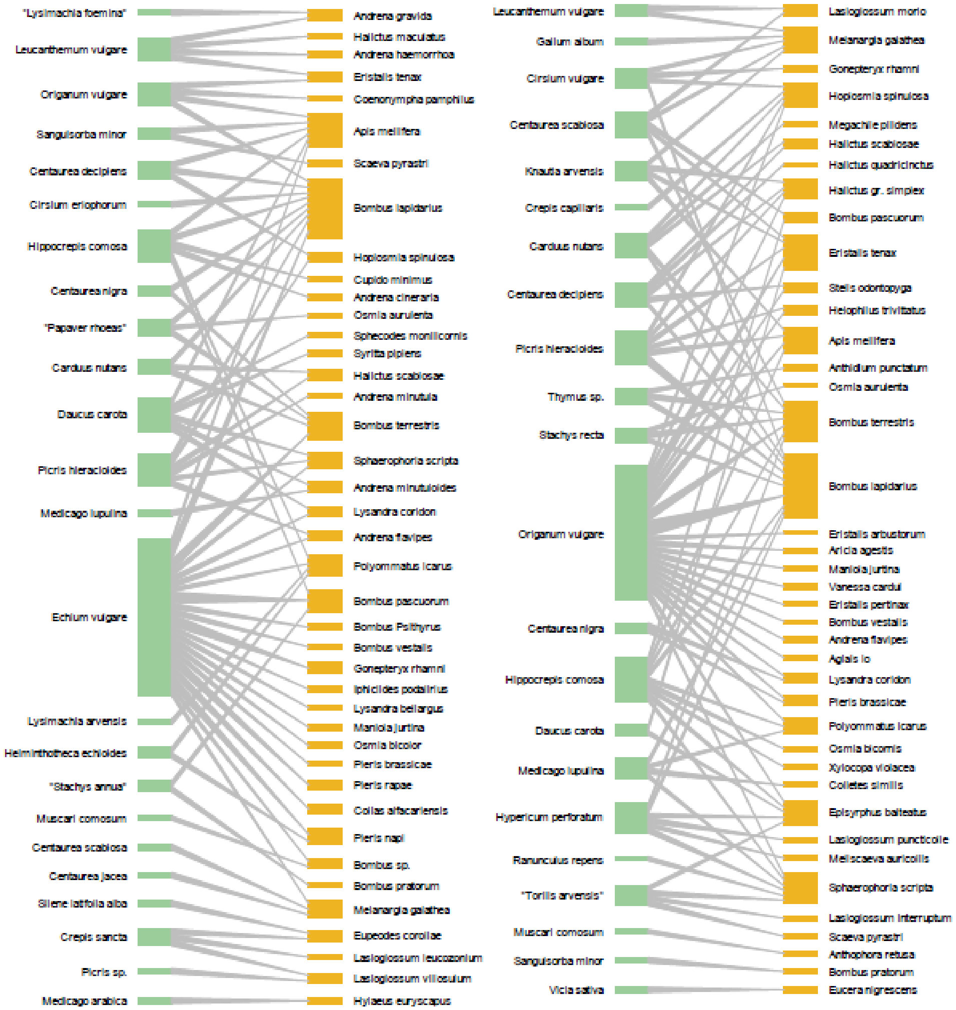
Horticoles et cultivars … ?

Notion de leurre écologique

Une prairie oui, mais laquelle ?

Stabilité des réseaux plantes-pollinisateurs



Semis

Des millions d'années de coévolution ! → **diversité**

provenance

phénologie

dérèglement climat.

Horticoles et cultivars … ?

Notion de leurre écologique

Synthèse des enjeux

OPIE

Gestion

Prairies

intrants

vermifuges

Fauche

tardive (sep. oct.)

export de fauche

centrifuge

<10 km/h

Pâturage

ovin, bovin, équin

zones peu aces.

rotation

<1 UGB/ha

alternance ?

Lisières

Forêts

étagement

chandelles

Haies

étagement

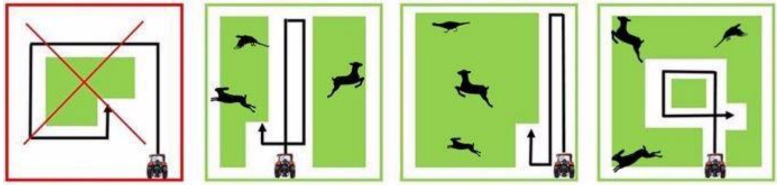
Entretien :
mi-mars à fin juillet

flore indigène

herbacée, arbustive, arborée

Floraison et fructification

Espaces refuges enfrichés non-entretenus régulièrement



Favoriser

Tas de pierres

Vieille végétation/végétation morte

Implantation de mares, de haies

micro-habitats

Paillage (feuilles mortes, fauche, etc.)

essences

conifères, platane...

Auxiliaires (cultures)

Panneaux pédagogiques

Flore indigène

...

Conclusion

Mettre en place une gestion adaptée

Fauche tardive, hauteur de coupe, zones refuges, pâturage → **connaitre son site !**

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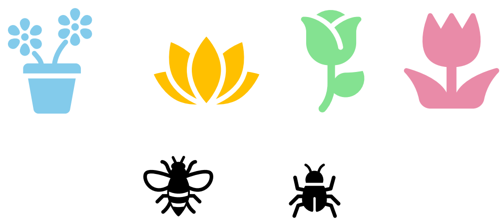
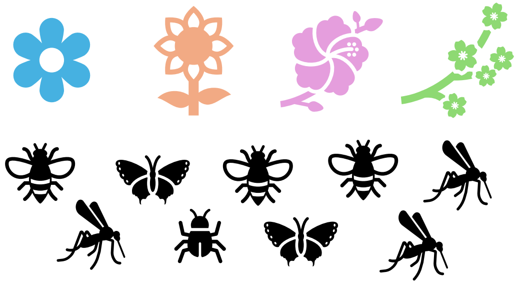
Protéger ces équilibres naturels





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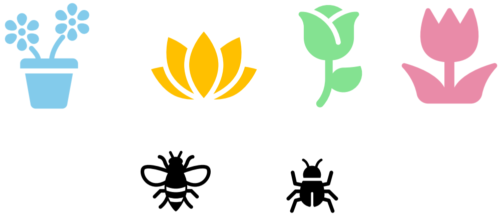
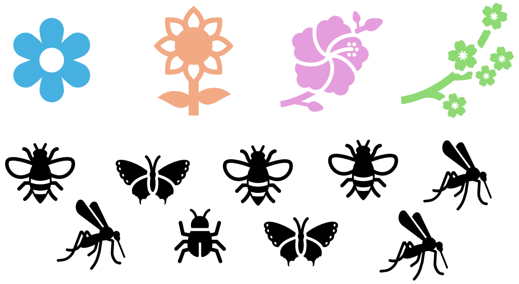
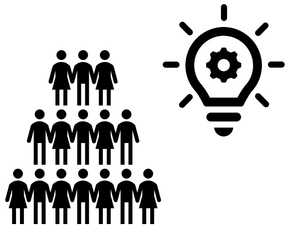




Sensibiliser nos citoyens à cette diversité



OPIE

Merci de votre attention !