Poll
Ole
GI

Iberian Meeting on Agroecological Research

Évora 2018

Exploring the effect of a green infrastructure on wild bee abundance and pollination services in adjacent sunflower fields

UAM UNIVERSIDAD AUTONOMA DE MADRID

Violeta Hevia, Libertad Chapinal; Jorge Ortega, Francisco M. Azcárate; César A. López Santiago; Paloma Alcorlo; José A. González.

Poll Ole GI

Rural green infrastructure promoting pollination

Who is involved in this project?

Universidad de Burgos (Coordinadorxs)

Universidad de Coimbra (Portugal)

Universidad Autónoma de Madrid (LabSES)

Centre Nationale de la Recherche Scientifique -CNRS (Francia)

Institut National de la Recherche Agronomique-INRA (Francia)

Farmers of study areas

Local / regional Administrations and associations

AVUNTAMIENTO SAN LORENZO DE LA PARRILLA

cooperativas agro-alimentarias Castilla-La Mancha

Seed productors

SEMILLAS CANTUESO

FUNDACIÓN oxígeno

AEA ASOCIACIÓN ESPAÑOLA DE APICULTORES

...

Interreg Sudoe

Poll Ole GI

Poll Ole GI

Rural green infrastructure promoting pollination

Objetives

Main objetive:

Improve the protection of pollinators and ecosystem services in agroecosystems of the SUDOE region through the construction of green infrastructures.

Interreg Sudoe

Poll Ole GI

Poll Ole Gl

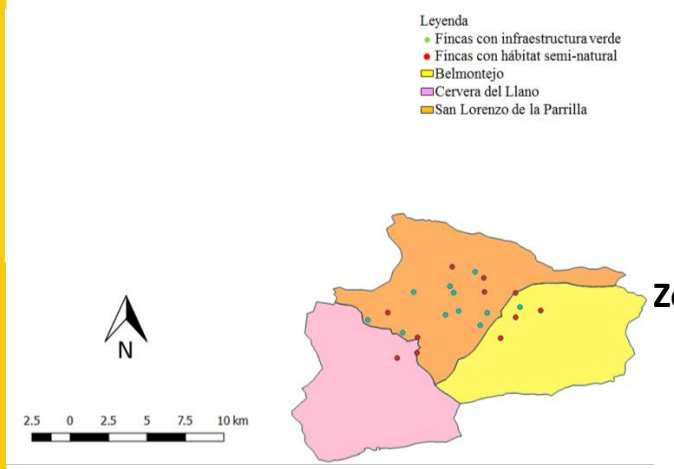
Rural green infrastructure promoting pollination

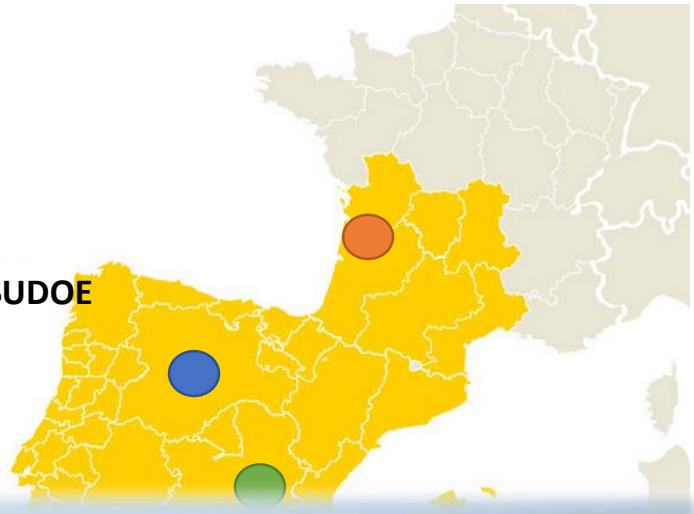
Study areas

Main objetive:

Improve the protection of pollinators and ecosystem services in agroecosystems of the SUDOE region through the construction of green infrastructures.

Study áreas:





Zona SUDOE

Cuenca

Interreg Sudoe

Poll Ole Gl

Rural green infrastructure promoting pollination

Why are we interested?

- Pollination is one of the key processes for the maintenance of biodiversity and agricultural production.
- The contribution of pollination was valued at 153 billion €[1].
- 84% of the cultivated species depend on insect pollination[2].
- Bees are the most important pollinators[3].

Decline in the number of individuals

GLOBAL POLLINATION CRISIS[4]

[1] Gallai *et al.*, 2009. *Ecological Economics.* [2] Williams, 1994. *Agricultural Zoology Reviews.*
[3] Potts *et al.*, 2010. *Trends in ecology & evolution.* [4] Novais *et al.*, 2016. *PloS one.*

Rural green infrastructure promoting pollination

Why are we interested?

- Agricultural intensification has negative effects on the richness of bees.[1].
- Semi-natural habitats with native vegetation are important for wildlife conservation[2].
- «Green infrastructures» as a priority line of the EU to maintain biodiversity in agroecosystems.

Natural or semi-natural areas designed and managed for the maintenance of ecosystem services.

[1] Garibaldi *et al.*, 2011. *Ecology letters.* [2] Billeter *et al.*, 2008. *Journal of Applied Ecology.*

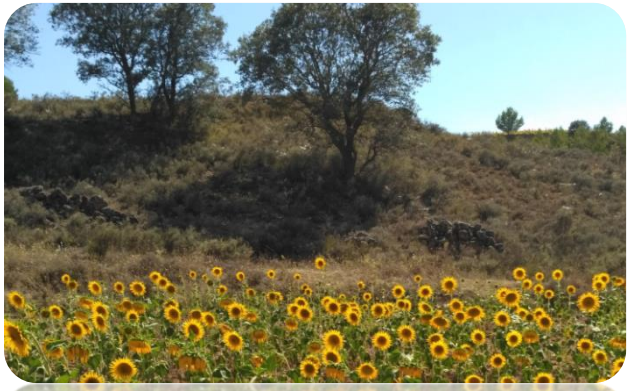
Poll Ole GI

Rural green infrastructure promoting pollination

How we did it?

We chose 22 sunflower plots separated by at least 500 m:

11 of them adjacent to semi-natural habitat.



11 plots where green infrastructures were installed.

- Floral mixture consisting of 12 species.
- 2 nest boxes

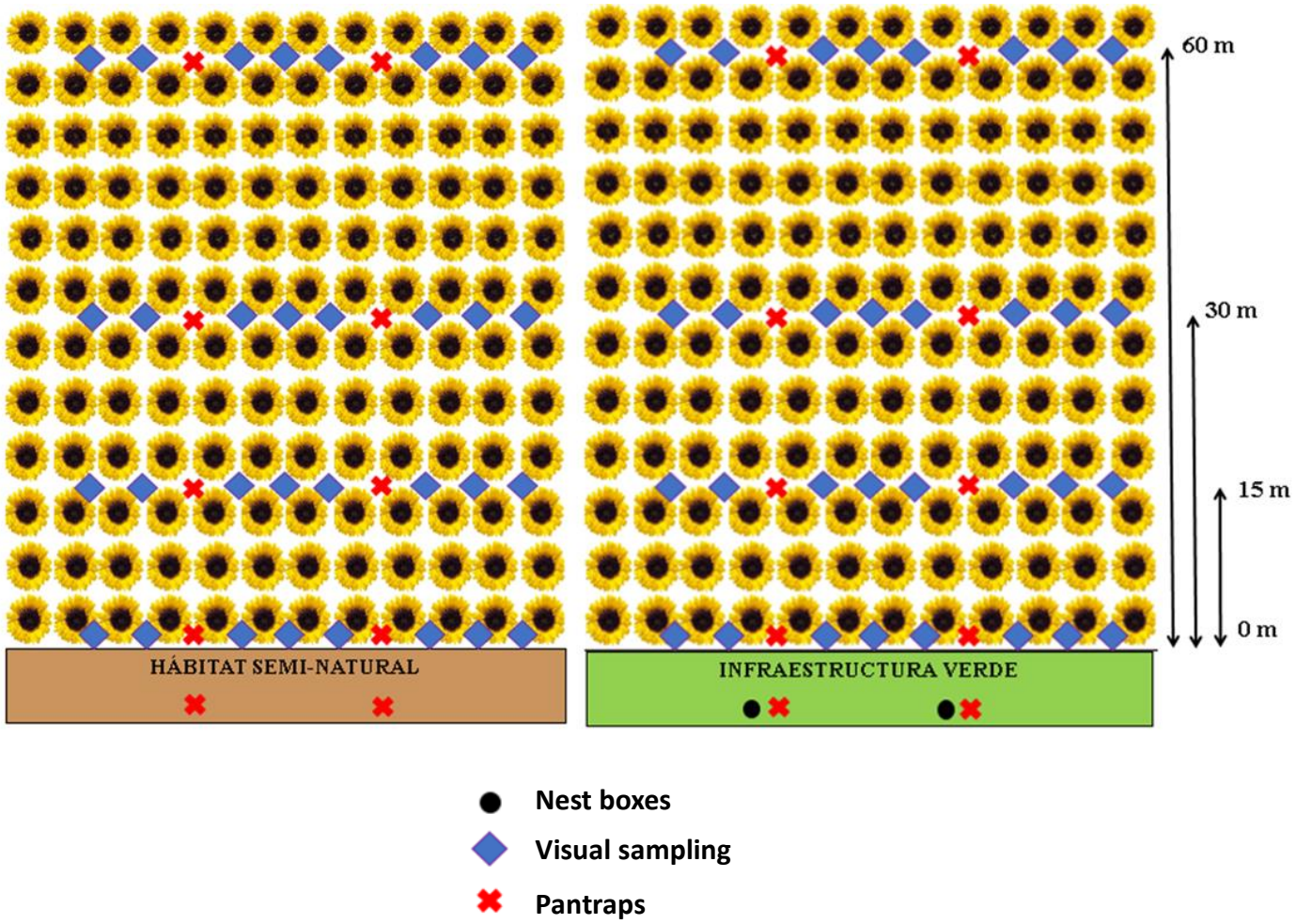
Interreg Sudoe

Poll Ole GI

Poll Ole Gl

Rural green infrastructure promoting pollination

Sampling design



Interreg Sudoe

Poll Ole Gl

Rural green infrastructure promoting pollination

How we did it?

Data collection

2 pantraps per distance

32 sunflowers/min/distance

200 seeds per sunflower

Interreg Sudoe
Poll Ole GI

Poll Ole GI

Rural green infrastructure promoting pollination

How we did it?

Local stakeholders
Farmers
Researchers
Associations
Students

Interreg Sudoe

Poll Ole GI

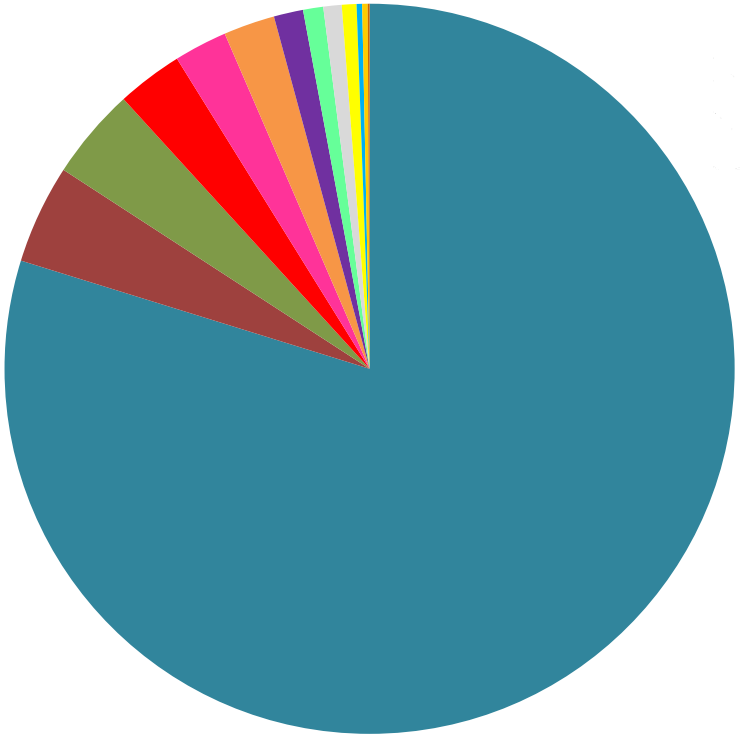
Poll Ole Gl

Rural green infrastructure promoting pollination

Results

We collected 2431 bees:

51 species



- *Lasioglossum*
- *Ceratina*
- *Halictus*
- *Xylocopa*
- *Megachile*
- *Amegilla*
- *Andrena*
- *Bombus*
- *Tetraloniella*
- *Hylaeus*
- *Dasypoda*
- *Lithurgus*
- *Hoplitis*

Interreg Sudoe
European Regional Development Fund
Poll Ole Gl

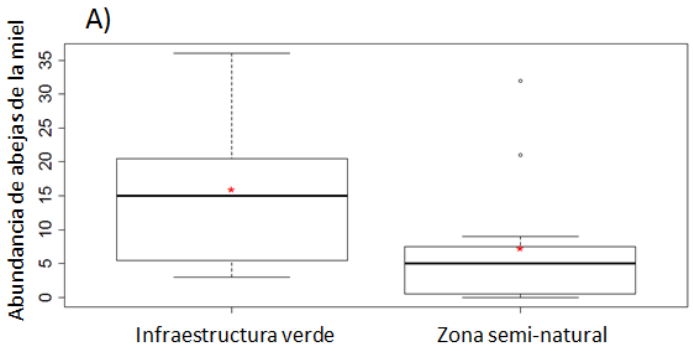
Poll Ole GI

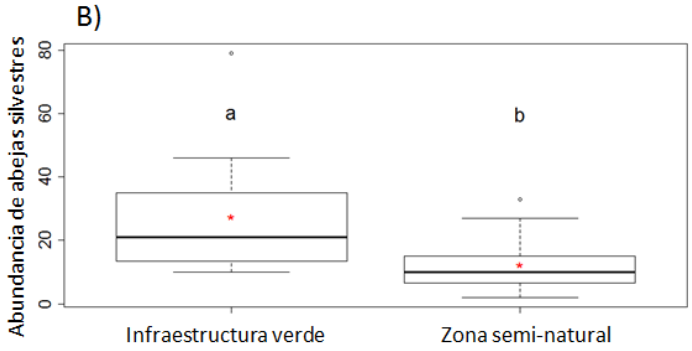
Rural green infrastructure promoting pollination

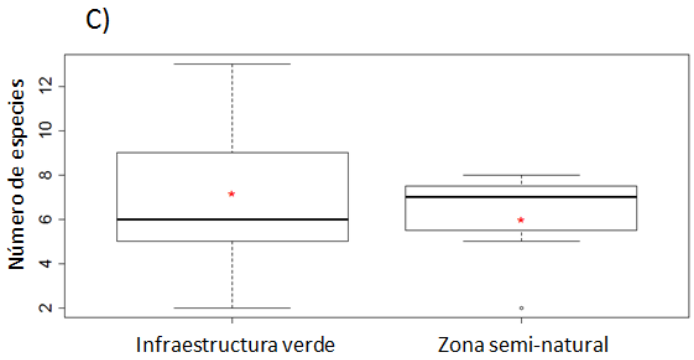
Results

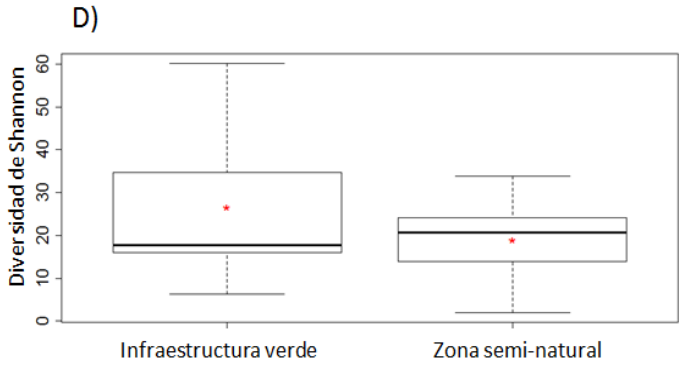
Abundance and diversity in GI and semi-natural areas

More abundance of wild bees in the GI









Interreg Sudoe

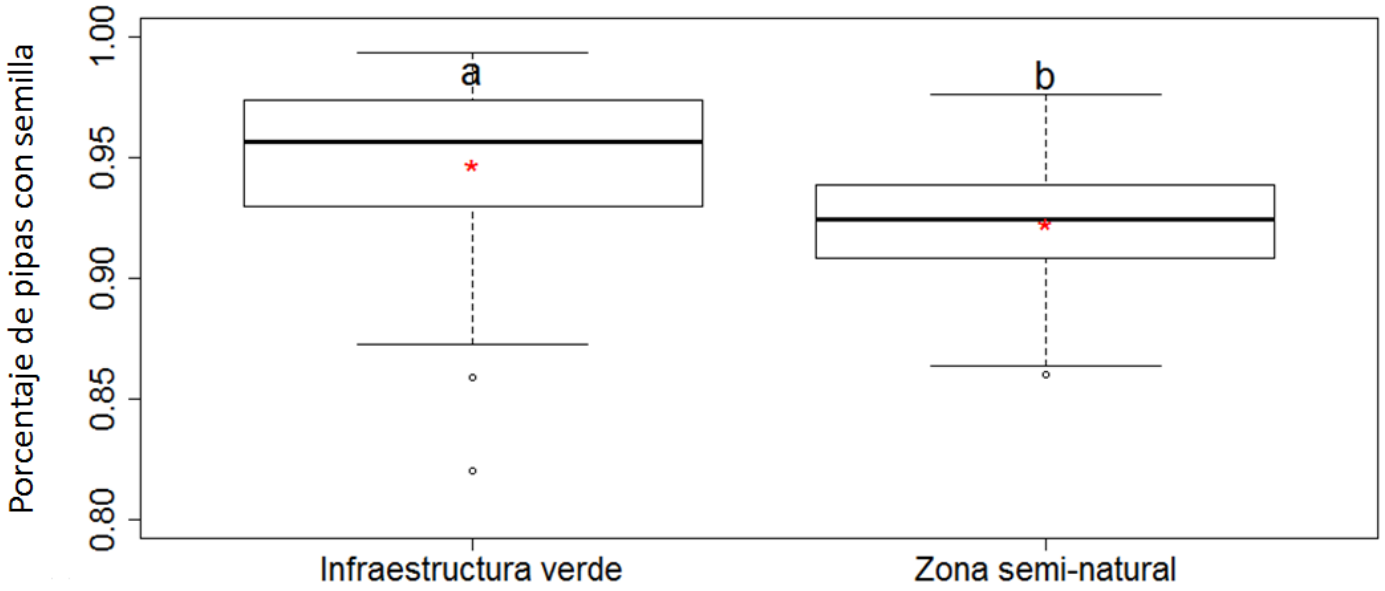
Poll Ole GI

Poll Ole GI

Rural green infrastructure promoting pollination

Results

Effects on the Sunflower seeds production



Higher percentage of full seeds on plots adjacent to green infrastructures.

Poll Ole GI

Rural green infrastructure promoting pollination

The role of GI and semi-natural habitats

- Semi-natural habitats provide food and refuge to a large number of wild bee species.
- The green infrastructures have peaks of flowering that benefits the abundance of wild bees.
- There are no differences in the presence of bees in the different distances inside the sunflower fields.

Semi-natural habitats are sources of diversity in agricultural landscapes.

Interreg Sudoe
European Regional Development Fund
Poll Ole GI

Rural green infrastructure promoting pollination

Effects on pollination and production in sunflower crops

-The main pollinator of intensive sunflower crops is the honey bee.

-The visit rate of wild bees is influenced by the distance to green infrastructures.

-Wild bees are not the main pollinators, but they contribute to increasing the **resilience of agroecosystems**.

-The installation of green infrastructures in intensive agroecosystems favors the production of sunflower seeds.

Interreg Sudoe
European Regional Development Fund
Poll Ole GI

Poll Ole GI

Rural green infrastructure promoting pollination

Implications for agroecosystem management

-Green infrastructures could increase the **presence of wild bees** in intensive farming systems.

-Utility by increasing **connectivity** and reducing fragmentation.

-In landscapes with intensive agriculture, the installation of green infrastructures would increase the productivity of the sunflower crops.

Interreg Sudoe

Poll Ole GI

Poll Ole GI

Rural green infrastructure promoting pollination

Thank you!

Violeta Hevia Martín

violeta.hevia@uam.es

www.uam.es/socioecosistemas

Interreg Sudoe
European Regional Development Fund

Poll Ole GI

Especie	Porcentaje en la mezcla
Borago officinalis	15%
Calendula arvensis	15%
Coriandrum sativum	15%
Salvia pratenis	5%
Melilotus officinalis	10%
Diplotaxis erucoides	1%
Echium plantagineum	5%
Silene vulgaris	1%
Vicia sativa	10%
Nigella damascena	3%
Sinapis alba	10%
Medicago sativa	10%

Poll Ole Gl

Rural green infrastructure promoting pollination

Cuestiones para el debate

¿Este tipo de medidas son viables para lxs agricultorxs?

¿Cómo podría plantearse una estrategia de apoyo a estas medidas desde la PAC?

¿Tiene sentido enfocar las estrategias sólo en los productores?

¿Existen estrategias complementarias a la instalación de Infraestructuras Verdes?

Interreg Sudoe
European Regional Development Fund
Poll Ole Gl